UNITED NATIONS

EP

UNEP/OzL.Pro.WG.1/40/2

Distr.: General
17 April 2018

Original: English

United Nations Environment Programme

Open-ended Working Group of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer
Fortieth meeting
Vienna, 11–14 July 2018
Items 3–9 of the provisional agenda*

Issues for discussion by and information for the attention of the Open-ended Working Group of the Parties to the Montreal Protocol at its fortieth meeting

Note by the Secretariat

I. Introduction

1. The present note provides an overview of the issues on the provisional agenda for the fortieth meeting of the Open-ended Working Group of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer. Section II sets out a summary of issues for discussion by the Open-ended Working Group. Section III sets out information that will not be addressed by the Open-ended Working Group at its fortieth meeting but that is relevant to the implementation of decisions by the parties, which is to be addressed by the Thirtieth Meeting of the Parties in November 2018. More specifically, section III provides updates on the implementation of decision XXIX/11 on safety standards; decision XXVIII/2 on the amendment phasing down hydrofluorocarbons (HFCs), and specifically on the work of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol in developing guidelines for funding the phase-down of hydrofluorocarbons in countries operating under paragraph 1 of Article 5 (Article 5 parties); and decision XXIX/24 on financial reports and budgets for the Montreal Protocol.

2. Further information on some of the agenda items will be provided in the addendum to the present note (UNEP/OzL.Pro.WG.1/40/2/Add.1) once the relevant reports by the Technology and Economic Assessment Panel have been finalized (see para. 16). The reports relate to agenda item 4 and its sub-items concerning the 2018 report of the Panel, as well as agenda item 6 (a) on the report of the Panel on energy efficiency while phasing down HFCs. The addendum sets out summaries of the reports of the Panel on those issues.

3. Furthermore, issues that are not directly related to follow-up on decisions will be addressed in an information note on issues that the Secretariat would like to bring to the attention of the parties (UNEP/OzL.Pro.WG.1/40/INF/2).

* UNEP/OzL.Pro.WG.1/40/1.

K1800820 220518

II. Summary of issues for discussion by the Open-ended Working Group at its fortieth meeting

Agenda item 3

Kigali Amendment to the Montreal Protocol to phase down hydrofluorocarbons

4. As at 16 April 2018, a total of 31 parties to the Montreal Protocol had ratified the Amendment to the Montreal Protocol on Substances that Deplete de Ozone Layer (Kigali Amendment).[1] In accordance with its article IV, the Amendment will enter into force on 1 January 2019, having fulfilled the requirement for its entry into force of the deposit of at least 20 instruments of ratification, acceptance or approval by parties to the Montreal Protocol.

(a) Data reporting under Article 7 and related issues

5. At the Twenty-Ninth Meeting of the Parties, held in Montreal, Canada, from 20 to 24 November 2017, the contact group on data reporting and destruction that had been established at the thirty-ninth meeting of the Open-ended Working Group, held in Bangkok from 11 to 14 July 2017, was reconvened and continued its discussions. The co-chairs of the contact group, which was unable to conclude its work during the time allotted, reported to the plenary that the group had reached agreement on a draft decision on destruction technologies for HFCs and on the issue of trade with non-parties but not on the other issues on its agenda. The parties agreed that data reporting issues would be included in the agenda of the fortieth meeting of the Open-ended Working Group and that the Working Group would decide how best to proceed thereafter. The Co-Chair of the preparatory segment suggested that the Secretariat could incorporate the observations of the contact group into the documentation prepared for that meeting.

6. Accordingly, the note by the Secretariat on data reporting under Article 7 of the Montreal Protocol including related issues arising from the Kigali Amendment to the Montreal Protocol to phase down HFCs (UNEP/OzL.Pro.WG.1/40/3), sets out a summary of the status of the discussions in the contact group. The note outlines the issues that have been addressed and on which a way forward has been agreed and identifies issues that need further consideration.

Issues that have been addressed and on which a way forward has been agreed:

(a) Process for approving destruction technologies for HFCs;

(b) Trade with non-parties and associated reporting;

Issues for further consideration:

(c) Timeline for reporting of baseline data for HFCs by Article 5 parties;

(d) Global-warming-potential values for HCFC-141 and HCFC-142;

(e) Revised data reporting forms and associated instructions, including the reporting of HFC mixtures and blends.

7. The Open-ended Working Group may wish to decide on how to take the remaining issues forward.

(b) Destruction technologies for controlled substances (decision XXIX/4)

8. During 2017, the parties discussed the process of approving destruction technologies for HFCs (substances listed in Annex F) so that when the parties begin to implement the control measures to phase down HFCs, they may destroy unwanted amounts of substances using technologies approved by the parties. The destroyed amounts would be subtracted from calculated production after the control measures become binding in 2019 following the entry into force of the Kigali Amendment for those parties that have ratified, accepted or approved it by that date.

9. Furthermore, paragraph 6 of Article 2J of the Montreal Protocol requires that "each party manufacturing Annex C, Group I, or Annex F substances shall ensure that for the twelve-month period commencing on 1 January 2020, and in each twelve-month period thereafter, its emissions of Annex F, Group II, substances generated in each production facility that manufactures Annex C, Group I, or Annex F substances are destroyed to the extent practicable using technology approved by the parties in the same twelve-month period." Paragraph 7 of Article 2J further states that "each party shall ensure

[1] See UNEP/OzL.Pro.WG.1/40/INF/3 on the status of ratification of the Kigali Amendment.

that any destruction of Annex F, Group II, substances generated by facilities that produce Annex C, Group I, or Annex F substances shall occur only by technologies approved by the parties." The provisions are applicable to Article 5 parties and parties not operating under paragraph 1 of Article 5 (non-Article 5 parties).

10. By its decision XXIX/4, the Twenty-Ninth Meeting of the Parties requested the Technology and Economic Assessment Panel to report by 31 March 2018, and if necessary to submit a supplemental report to the Open-ended Working Group at its fortieth meeting, on:

(a) An assessment of the destruction technologies as specified in the annex to decision XXIII/12 with a view to confirming their applicability to HFCs;

(b) A review of any other technology for possible inclusion in the list of approved destruction technologies in relation to controlled substances.

11. In the same decision, the Twenty-Ninth Meeting of the Parties invited parties to submit to the Secretariat by 1 February 2018 information relevant to the report to be prepared by the Technology and Economic Assessment Panel on the tasks referred to in paragraph 10 above. The Secretariat has received submissions from 10 parties: Armenia, Australia, Canada, China, the European Union, Japan, Luxembourg, Mexico, the United States of America, Venezuela (Bolivarian Republic of). The information that parties have confirmed as non-confidential has been compiled in a separate document and will be posted on the meeting portal for the fortieth meeting of the Open-ended Working Group.

12. The Technology and Economic Assessment Panel established a task force to respond to the decision, and an advance version of the report by the task force was issued on 3 April 2018 as volume 2 of the 2018 report of the Panel.

13. The task force assessed the approved destruction technologies listed in the annex to decision XXIII/12 and their applicability to HFCs, as well as other technologies for consideration for possible inclusion in the list of approved technologies. The task force presented the details of its assessment of and the recommendations for approved destruction technologies in chapter 3 and the other technologies in chapter 4 of its report . The task force further presented a summary table of the recommendations on each technology in chapter 5 of its report and a written summary in appendix 3 of the same report. Chapter 5 and appendix 3 are reproduced in annexes I and II to the present note.[2]

14. In assessing the technologies, the task force used the same requirements that were used previously for ozone-depleting substances, namely destruction and removal efficiency of a minimum of 99.99 per cent for concentrated sources or 95 per cent for diluted sources, and demonstration that hydrogen fluoride emissions are less than 5 mg/Nm^3 and carbon monoxide emissions are less than 100 mg/Nm^3. The task force made the following observations:

(a) Thermal oxidation and plasma arc technologies that have already met the performance criterion for chlorinated dioxins and furans for the destruction of ozone-depleting substances are considered capable of meeting the same performance criterion when used for the destruction of HFCs;

(b) The available data for thermal oxidation and plasma arc technologies suggest that fluorinated dioxins and furans are much more difficult to form, and are not formed under conditions where chlorinated dioxins are formed;

(c) Since HFCs may contain ozone-depleting substances as impurities or as part of a mixed waste, dioxin/furan analysis would be appropriate and may be mandatory under local requirements;

(d) For particulates, approved thermal oxidation and plasma arc destruction technologies for ozone-depleting substances are considered capable of meeting the same performance criterion when used for HFC destruction. However, analysis of total suspended particulates could be required as they could be introduced by other waste streams to be co-destroyed with ozone-depleting substances or HFCs;

(e) Owing to the unique and varied methods involved in conversion (or non-incineration) technologies,[3] the task force considered it necessary that these technologies demonstrate that they can meet all of the emissions performance criteria;

[2] The format has been altered from the original version in the report of the task force.

[3] Conversion or non-incineration technologies irreversibly transform halocarbons (including to other saleable products, e.g., acids, vinyl monomers etc.). They primarily rely on chemical transformation to destroy substances.

(f) In a number of cases, the task force was unable to make a recommendation without additional information.

15. The Panel will be issuing a supplemental report for the Open-ended Working Group that takes into account the further information that it has received on the destruction technologies. A summary of the supplemental report will be provided in the addendum to the present note. The new information may induce substantive changes in the recommendations provided by the task force.

Agenda item 4

Technology and Economic Assessment Panel 2018 report

16. The Technology and Economic Assessment Panel 2018 report consists of the following five volumes:

(a) Volume 1: Decision XXIX/9: Hydrochlorofluorocarbons and decision XXVII/5 (March 2018);

(b) Volume 2: Decision XXIX/4: Destruction technologies for controlled substances (April 2018);

(c) Volume 3: Technology and Economic Assessment Panel 2018 progress report (May 2018) containing, inter alia, process agent issues, progress reports by each technical options committee, including that of the Halons Technical Options Committee on progress with decision XXIX/8 on future availability of halons and their alternatives, and organizational and membership issues;

(d) Volume 4: Critical-use nominations assessment, interim report (May 2018);

(e) Volume 5: Decision XXIX/10: Issues related to energy efficiency while phasing down hydrofluorocarbons (May 2018).

17. Under agenda item 4, the Panel will present volumes 3 and 4 of its 2018 report and inform the parties on its progress with its report on the laboratory and analytical procedures, covering the following five sub-items:

(a) Nominations for critical-use exemptions for methyl bromide for 2019 and 2020;

(b) Progress in the implementation of decision XXIX/8 on future availability of halons and their alternatives;

(c) Development and availability of laboratory and analytical procedures that can be performed without using controlled substances under the Protocol (decision XXVI/5);

(d) Process agents (decision XVII/6);

(e) Organizational and other matters.

18. The information and recommendations of the Panel set out in volumes 3, 4 and 5 to be issued in May 2018 (see paragraph 16 above) will be summarized in the addendum to the present note, which is to be made available to the parties before the fortieth meeting of the Open-ended Working Group.

19. The Panel will give separate presentations on its report on hydrochlorofluorocarbons (HCFCs) (volume 1), destruction technologies (volume 2) and energy efficiency (volume 5) under agenda items 7, 3 (b) and 6 (a) respectively.

(a) Nominations for critical-use exemptions for methyl bromide for 2019 and 2020

20. In 2018, two Article 5 parties (Argentina and South Africa) submitted four nominations for critical-use exemptions for 2019, and two non-Article 5 parties (Australia and Canada) submitted one nomination each for 2020 and 2019 respectively. China, which has put forward methyl bromide nominations in recent years, has notified the Secretariat that it does not intend to submit further nominations for critical uses.

21. During its meeting held in Melbourne, Australia, from 5 to 9 March 2018, the Methyl Bromide Technical Options Committee reviewed, among other things, the critical-use nominations and additional information submitted by the nominating parties in response to the first round of questions by the Committee. The interim recommendations on the quantities of methyl bromide eligible for exemption will be included in the report of the Committee, to be made available in volume 4 of the Technology and Economic Assessment Panel 2018 report. The interim recommendations and associated information will be summarized in the addendum to the present note. Meanwhile, the

parties that have submitted nominations for critical-use exemptions and the quantities that they have nominated for 2019 and 2020 are listed in the table below.

Summary of the nominations for 2019 and 2020 critical-use exemptions for methyl bromide submitted in 2018 (tonnes)[a]

Parties not operating under paragraph 1 of Article 5 and sectors	*Nomination for 2019*	*Nomination for 2020*
1. Australia		
Strawberry runners		28.98
2. Canada		
Strawberry runners	5.261	
Subtotal	**5.261**	**28.98**

Parties operating under paragraph 1 of Article 5 and sectors	*Nomination for 2019*
3. Argentina	
Tomato (protected)	44.4
Strawberry fruit (open field)	27.1
4. South Africa	
Mills	2.0
Structures	45.0
Subtotal	**118.5**
GRAND TOTAL	**123.761** **28.98**

[a] Tonne = metric ton.

(b) Progress in the implementation of decision XXIX/8 on future availability of halons and their alternatives

22. In its decision XXIX/8 on future availability of halons and their alternatives, based on the progress report of the Halons Technical Options Committee contained in the 2017 Technology and Economic Assessment Panel report, the Twenty-Ninth Meeting of the Parties requested the Technology and Economic Assessment Panel, through its Halons Technical Options Committee, to (i) continue to liaise with the International Civil Aviation Organization on the development and implementation of alternatives to halons, and their rate of adoption by civil aviation, and to report thereon in its 2018 progress report; (ii) explore the possibility of forming a joint working group with the International Civil Aviation Organization to carry out a study to determine the current and projected future quantities of halons installed in civil aviation fire protection systems, the associated uses and releases of those halons and any potential courses of action to reduce those uses and releases; and (iii) submit a report on the work of the joint working group, if established, before the Thirtieth Meeting of the Parties and the fortieth session of the Assembly of International Civil Aviation Organization.

23. A progress report on that issue by the Halons Technical Options Committee is expected to be included in the 2018 report of the Panel.

(c) Development and availability of laboratory and analytical procedures that can be performed without using controlled substances under the Protocol (decision XXVI/5)

24. By its decision XXVI/5, the Twenty-Sixth Meeting of the Parties extended the global laboratory and analytical-use exemption until 31 December 2021, under the conditions set out in annex II to the report of the Sixth Meeting of the Parties and decisions XV/8, XVI/16 and XVIII/15, for all controlled substances except those listed in Annex C, group 1 (i.e., HCFCs). In the same decision, the Meeting of the Parties requested the Technology and Economic Assessment Panel to report no later than 2018 on the development and availability of laboratory and analytical procedures that could be performed without using controlled substances. The Panel, in its presentation, is expected to inform the Open-ended Working Group on the progress made in preparing its report.

(d) Process agents (decision XVII/6)

25. In paragraph 7 of its decision XVII/6 on process agents, the Seventeenth Meeting of the Parties requested the Technology and Economic Assessment Panel to review the information submitted in accordance with the decision and to report and make recommendations to the parties at their Twentieth Meeting, in 2008, and every other year thereafter, on process-agent use exemptions, on insignificant

emission associated with a use, and process-agent uses that could be added to or deleted from table A of decision X/14.

26. In paragraph 8 of the same decision, the Meeting of the Parties also requested parties with process-agent uses to submit data to the Technology and Economic Assessment Panel by 31 December 2007 and 31 December of each subsequent year on opportunities to reduce emissions listed in table B and for the Panel to review in 2008, and every other year thereafter, emissions in table B of decision X/14, taking into account information and data reported by the parties in accordance with that decision, and to recommend any reductions to the make-up and maximum emission on the basis of that review. On the basis of those recommendations, the Parties were to decide on reductions to the make-up and maximum emissions with respect to table B.

27. The Technology and Economic Assessment Panel 2018 report is expected to provide a review pursuant to that decision. A summary of the review will be provided in the addendum to the present note.

28. Furthermore, by its decision XXIX/7 on the use of controlled substances as process agents, the Twenty-Ninth Meeting of the Parties agreed to update table A of decision X/14 and urged parties to update their information on the use of controlled substances as process agents and to provide the Secretariat, by 31 December 2017, with information on the implementation and development of emissions reduction techniques. China, the European Union and the United States of America submitted relevant information. By the same decision, the Meeting of the Parties also requested the Technology and Economic Assessment Panel to report to the Open-ended Working Group at its forty-first meeting on the industrial application of any alternative technologies employed by parties in the processes listed in table A, as updated by the decision. The information will be presented by the Panel at the forty-first meeting of the Open-ended Working Group.

(e) Organizational and other matters

29. The report of the Technology and Economic Assessment Panel normally contains information on organizational and administrative issues relating to the work of the Panel and its technical options committees. The Secretariat will include, in the addendum to the present note, any organizational and administrative issues discussed in the 2018 report of the Panel.

30. In the addendum to the present note, the Secretariat will also summarize any other key issues that the Panel raises in its report that may need the attention of the parties. Parties may also wish to raise issues of concern to be discussed by the Open-ended Working Group.

Agenda item 5

Linkages between hydrochlorofluorocarbons and hydrofluorocarbons in transitioning to low-global-warming-potential alternatives (UNEP/OzL.Conv.11/7–UNEP/OzL.Pro.29/8, para. 162)

31. At the Twenty-Ninth Meeting of the Parties, the representative of Saudi Arabia introduced the subject of linkages between HCFCs and HFCs, with particular reference to paragraphs 6–8 of decision XXVIII/2. He explained that his country's concern was to avoid the need for industry to carry out a double transition, from HCFCs to high-global-warming-potential HFCs and subsequently to low-global-warming-potential alternatives. In paragraph 6 of decision XXVIII/2, the parties had recognized a need for flexibility if no other technically proven and economically viable alternatives were available. A mechanism to put that principle into effect was needed. While Saudi Arabia did not have firm proposals to put forward and was not expecting a decision to be taken at the time, the representative wished to signal the importance of the issue to Article 5 parties and to encourage a constructive discussion on the topic.

32. During the discussion, parties expressed their views on the issue raised by the representative of Saudi Arabia (see UNEP/OzL.Conv.11/7–UNEP/OzL.Pro.29/8, paras. 155–161). Some of the concerns raised during the discussion were related to the availability of suitable technology and substances to replace HCFCs, the particular needs of low-volume consuming countries, the need to avoid double conversions and the specific challenges of high-ambient-temperature countries with alternative technologies in some sectors. A number of representatives drew attention to the provisions of decision XXVIII/2, in which parties had envisaged the possibility of deferring consideration of the HCFC compliance status of any party operating under a high-ambient-temperature exemption. They also pointed out the role of the Montreal Protocol in providing information rather than prescribing the use of particular technology.

33. The Co-Chair acknowledged the concerns of the parties, and the parties agreed to include the issue on the agenda of the fortieth meeting of the Open-ended Working Group (UNEP/OzL.Conv.11/7–UNEP/OzL.Pro.29/8, para. 162). The Working Group may wish to further discuss the matter to develop a way forward.

Agenda item 6

Issues related to energy efficiency while phasing down hydrofluorocarbons (decision XXIX/10)

(a) Report by the Technology and Economic Assessment Panel on energy efficiency in the refrigeration, air-conditioning and heat pump sectors

34. In its decision XXIX/10, the Twenty-Ninth Meeting of the Parties requested the Technology and Economic Assessment Panel, in relation to maintaining and/or enhancing energy efficiency in the refrigeration, air-conditioning and heat-pump sectors, including in high-ambient-temperature conditions, while phasing down hydrofluorocarbons under the Kigali Amendment to the Montreal Protocol in Article 5 parties, to assess the following items:

(a) Technology options and requirements including:

(i) Challenges to their uptake;

(ii) Their long-term sustainable performance and viability;

(iii) Their environmental benefits in terms of carbon dioxide equivalents;

(b) Capacity-building and servicing sector requirements in the refrigeration and air-conditioning and heat-pump sectors;

(c) Related costs including capital and operating costs.

35. In the same decision, the parties also requested the Panel "to provide an overview of the activities and funding provided by other relevant institutions, as well as definitions, criteria and methodologies used in addressing energy efficiency in the refrigeration, air-conditioning and heat-pump sectors in relation to maintaining and/or enhancing energy efficiency in the refrigeration, air-conditioning and heat-pump sectors while phasing down hydrofluorocarbons under the Kigali Amendment to the Montreal Protocol, as well as those related to low-global-warming-potential (GWP) and zero-GWP hydrofluorocarbon alternatives including on different financing modalities".

36. The Panel was further requested "to prepare a final report for consideration by the Open-ended Working Group at its fortieth meeting, and thereafter an updated final report to be submitted to the Thirtieth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer taking into consideration the outcome of the workshop described in paragraph 4 [of the same decision]" (see paras. 38–40 below regarding the workshop).

37. The Technology and Economic Assessment Panel is expected to finalize its report in response to that decision in May 2018. The addendum to the present note will set out the summary of the report.

(b) Outcome of the workshop on energy efficiency opportunities while phasing down hydrofluorocarbons

38. In decision XXIX/10, the parties requested the Secretariat to organize a workshop on energy efficiency opportunities while phasing down hydrofluorocarbons, at the fortieth meeting of the Open-ended Working Group. The workshop will be held on 9 and 10 July 2018 immediately prior to the Open-ended Working Group meeting.

39. The request for a workshop was based on the parties' recognition of the importance of maintaining and/or enhancing energy efficiency while transitioning away from high-GWP HFCs to low-GWP alternatives in the refrigeration, air-conditioning and heat pump sectors; that the use of air-conditioning and refrigeration is growing in countries operating under paragraph 1 of Article 5; and that maintaining or enhancing energy efficiency could have significant climate benefits. The workshop has been designed to provide a forum to discuss:

(a) Technical opportunities to improve energy efficiency in the refrigeration, air-conditioning and heat pump sectors;

(b) Investment, financial and policy aspects that can maximize energy efficiency improvements in refrigeration, air-conditioning and heat pump systems while phasing down the use of HFCs.

40. The conclusions of the workshop will be presented to the Open-ended Working Group, which may wish to discuss and consider further action that may be taken on energy efficiency and make recommendations as appropriate.

Agenda item 7

Requirements for hydrochlorofluorocarbons for the period from 2020 to 2030 for parties not operating under paragraph 1 of Article 5 of the Protocol (decision XXIX/9)

41. In its decision XXIX/9 on hydrochlorofluorocarbons and decision XXVII/5, the Twenty-Ninth Meeting of the Parties requested the Technology and Economic Assessment Panel, in relation to Annex C, group I, substances (i.e., HCFCs), to assess requirements for the period from 2020 to 2030 for non-Article 5 parties and to provide information on the following:

(a) Areas and volumes of possible needs in fire suppression sectors that may require the use of clean agents;

(b) Areas and volumes of possible needs for solvent applications, including servicing;

(c) Areas and volumes of possible other niche uses;

(d) Existing or emerging applications and processes for alternatives related to items (a) to (c) above and the possibility of meeting identified needs through the use of recycled or reclaimed HCFCs.

42. In the same decision, the Twenty-Ninth Meeting of the Parties invited parties and other interested entities to provide additional information to the Secretariat by 15 January 2018 for inclusion in the Panel's progress report, and requested the Panel to report on the matter by 15 March 2018. Nine parties, namely Armenia, Azerbaijan, Canada, Costa Rica, Japan, Kazakhstan, Mexico, Palau and the Bolivarian Republic of Venezuela, as well as an interested entity in the United States of America, submitted information. The substantive parts of parties' submissions will be compiled in a separate document and will be posted on the meeting portal for the fortieth meeting of the Open-ended Working Group.

43. The Panel established a Working Group to respond to the decision, and its report was issued in March 2018. The Executive Summary of the report has been reproduced in annex III to the present note. The key conclusions of the Working Group may be summarized as follows:

(a) In fire protection, the volumes of HCFC-123 needed for the production of HCFC-based Blend B is estimated not to exceed 750 tonnes annually. Combined with potential amounts required for servicing, the total consumption may reach about 900 tonnes annually, or almost 20 ODP tonnes. Some specific continued uses of HCFCs include (i) aircraft rescue and firefighting at commercial and military airports; and (ii) in fixed fire protection systems in merchant shipping and military systems needing maintenance until the end of their economic lifetime. Some of the needs for HCFCs for fire protection may also be met through recycling and reclamation, for example from large (centrifugal) chillers;

(b) Any current solvent and other niche HCFC uses beyond 2020 might be around 250–500 tonnes (tens of ODP tonnes) annually, out of which about 50–200 tonnes are estimated for the annual HCFC requirements for existing aerospace or military equipment;

(c) The Panel suggested that parties may wish to consider how to treat HCFC solvent uses in several manufacturing processes that use HCFCs as solvents in a manner similar to process agent uses, which would potentially be impacted by the 2020 control measures for HCFC production and consumption in non-Article 5 parties. The total known annual use of HCFCs has been estimated at about 10 tonnes.

44. The Open-ended Working Group may wish to discuss the matter and recommend a way forward as appropriate.

Agenda item 8

Consideration of senior expert nominations from parties to the Technology and Economic Assessment Panel (decision XXIX/20)

45. In its decision XXIX/20, the Twenty-Ninth Meeting of the Parties appointed co-chairs of technical options committees and senior expert members of the Technology and Economic

Assessment Panel. The senior experts were appointed to serve on the Panel for one year, until the end of 2018.

46. During the discussion of the issue, parties were encouraged to hold consultations on potential nominations of senior experts and to refer to the matrix of expertise needed by the Panel prior to making nominations for appointments of senior experts.

47. The parties may wish to discuss further how they will consult on potential nominations and to consider any senior expert nominations to the Panel that may be submitted by parties on the basis of the matrix of expertise required.

III. Progress on decisions that will be addressed by the Thirtieth Meeting of the Parties

Ongoing progress on tabular overview of safety standards pursuant to decision XXIX/11 on safety standards

48. By its decision XXIX/11 on safety standards, the Twenty-Ninth Meeting of the Parties requested the Secretariat to hold regular consultations with the relevant standards bodies referred to in paragraph 7 of decision XXVIII/4 with a view to providing, with regard to standards for flammable low-GWP refrigerants, a tabular overview of relevant safety standards, drawing on the 2017 report of the task force on decision XXVIII/4 and the outcome of the consultations. The tabular overview should also include any relevant information submitted on a voluntary basis to the Secretariat by parties or by national and regional standards bodies.

49. The ongoing progress by the Secretariat on the issue will be summarized in a note entitled "Tabular overview of safety standards: progress to date", which will be made available under the background documents section in the meeting portal for the fortieth meeting of the Open-ended Working Group. Parties may wish to review the information and provide any comments and guidance to the Secretariat in the margins of the meeting for its presentation as an information note at the Thirtieth Meeting of the Parties.

Status of the work of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol in developing guidelines for funding the phase-down of HFCs under decision XXVIII/2

50. By paragraph 10 of its decision XXVIII/2, the Twenty-Eighth Meeting of the Parties requested the Executive Committee to develop, within two years of the adoption of the Amendment, guidelines for financing the phase-down of HFC consumption and production, including cost-effectiveness thresholds, and to present those guidelines to the Meeting of the Parties for the parties' views and inputs before their finalization by the Executive Committee. At the Twenty-Ninth Meeting of the Parties, the report of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol (UNEP/OzL.Pro.29/6), covering the activities undertaken by the Executive Committee since the Twenty-Eighth Meeting of the Parties, was issued and presented orally by the Chair of the Committee. The report consisted of four parts, dealing with policy matters related to the Kigali Amendment; other policy matters; projects, their implementation and monitoring; and business planning, administrative and financial matters.

51. The draft template of the cost guidelines (UNEP/OzL.Pro/ExCom/80/59, annex XXVIII) referred to in the report of the Executive Committee to the Twenty-Ninth Meeting of the Parties contains the principles agreed upon in decision XXVIII/2 and elements of the cost guidelines, including flexibility in implementation; the cut-off date for eligible capacity; second and third conversions; sustained aggregate reductions in HFC consumption and production; categories eligible for incremental costs; and eligibility of Annex F substances subject to high-ambient-temperature exemptions. Annex I of the report of the Executive Committee (UNEP/OzL.Pro/29/6) contains the decisions taken by the Committee so far on the matters arising from the Kigali Amendment, including those on the cost guidelines. The Executive Committee reported that it had agreed to submit the cost guidelines to the Thirtieth Meeting of the Parties and to finalize the guidelines as soon as possible thereafter.

52. The eighty-first meeting of the Executive Committee is scheduled to be held in Montreal from 18 to 22 June 2018, during which further discussion on developing guidelines for financing HFC phase-down is expected to take place. A comprehensive note on the guidelines will be presented to the Meeting of the Parties for the views and inputs of the parties.

Preparation of a results-based budget pursuant to decision XXIX/24 on financial reports and budgets for the Montreal Protocol on Substances that Deplete the Ozone Layer

53. In paragraph 12 of decision XXIX/24, the Twenty-Ninth Meeting of the Parties requested the Executive Secretary to prepare results-based budgets and work programmes for the years 2019 and 2020, presenting two budget scenarios and work programmes based on projected needs for the biennium in (a) a zero nominal growth scenario; and (b) a scenario based on further recommended adjustments to the first scenario and the added costs or savings related thereto. An advance version of the budget document[4] for the Thirtieth Meeting of the Parties is available to the parties in the meeting portal for the fortieth meeting of the Open-ended Working Group for information.

54. The document presents a proposed revision to the approved budget for 2018 and proposed budgets for 2019 and 2020 for the Trust Fund for the Montreal Protocol in the form of results-based budgets. The document describes the rationale and methodology used by the Secretariat to define the results framework. As a transitional measure, the budgets are also presented in the traditional format.

[4] UNEP/OzL.Pro.30/4.

Annex I

Recommendations for list of approved destruction technologies

The existing list of approved destruction technologies is shown in the table below in green. Recommendations relevant to this assessment are shown in red (for the assessment of the applicability of approved destruction technologies to HFCs and any other technologies for possible inclusion on the list of approved destruction technologies).

Technology	Applicability										
	Concentrated sources									Dilute sources	
	Annex A		Annex B			Annex C	Annex E	Annex F			Annex F
	Group 1	Group 2	Group 1	Group 2	Group 3	Group 1	Group 1	Group 1	Group 2		Group 1
	Primary CFCs	Halons	Other CFCs	Carbon tetrachloride	Methyl chloroform	HCFCs	Methyl bromide	HFCs	HFC-23	ODS	HFCs
DRE	99.99%	99.99%	99.99%	99.99%	99.99%	99.99%	99.99%	99.99%	99.99%	95%	95%
Cement kilns	Approved	Not approved	Approved	Approved	Approved	Approved	Not determined	High potential	High potential		
Gaseous/fume oxidation	Approved	Not determined	Approved	Approved	Approved	Approved	Not determined	Recommend for approval	Recommend for approval		
Liquid injection incineration	Approved	Approved	Approved	Approved	Approved	Approved	Not determined	High potential	High potential		
Municipal solid waste incineration										Approved	High potential
Porous thermal reactor	Approved	Not determined	Approved	Approved	Approved	Approved	Not determined	Recommend for approval	High potential		
Reactor cracking	Approved	Not approved	Approved	Approved	Approved	Approved	Not determined	High potential	High potential		
Rotary kiln incineration	Approved	Approved	Approved	Approved	Approved	Approved	Not determined	High potential	High potential	Approved	
Argon plasma arc	Approved	Approved	Approved	Approved	Approved	Approved	Not determined	High potential	High potential		
Inductively coupled radio frequency plasma	Approved	Approved	Approved	Approved	Approved	Approved	Not determined	Unable to assess	Unable to assess		
Microwave plasma	Approved	Not determined	Approved	Approved	Approved	Approved	Not determined	Unable to assess	Unable to assess		
Nitrogen plasma arc	Approved	Not determined	Approved	Approved	Approved	Approved	Not determined	High potential	High potential		
Portable plasma arc	Approved	Not determined	Approved	Approved	Approved	Approved	Not determined	High potential	High potential		
Chemical reaction with H_2 and CO_2	Approved	Approved	Approved	Approved	Approved	Approved	Not determined	High potential	High potential		

Technology	Applicability										
	Concentrated sources									Dilute sources	
	Annex A		Annex B			Annex C	Annex E	Annex F			Annex F
	Group 1	Group 2	Group 1	Group 2	Group 3	Group 1	Group 1	Group 1	Group 2		Group 1
	Primary CFCs	Halons	Other CFCs	Carbon tetrachloride	Methyl chloroform	HCFCs	Methyl bromide	HFCs	HFC-23	ODS	HFCs
DRE	99.99%	99.99%	99.99%	99.99%	99.99%	99.99%	99.99%	99.99%	99.99%	95%	95%
Gas phase catalytic dehalogenation	Approved	Not determined	Approved	Approved	Approved	Approved	Not determined	High potential	High potential		
Superheated steam reactor	Approved	Not determined	Approved	Approved	Approved	Approved	Not determined	High potential	High potential		
Thermal reaction with methane	Approved	Approved	Approved	Approved	Approved	Approved	Not determined	Unable to assess	Unable to assess		
Electric heater								High potential	High potential		
Fixed hearth incinerator	Unable to assess										
Furnaces								Unable to assess			
Thermal decay of methyl bromide							Unable to assess				
Air plasma arc	Unable to assess										
Alternating current plasma	Unable to assess										
CO_2 plasma	Unable to assess										
Steam plasma	Unable to assess										
Catalytic destruction											Unable to assess
Chlorination/de-chlorination to vinylidene chloride	Not a destruction technology										
Solid alkali reaction	Unable to Access										

Abbreviation: DRE, destruction and removal efficiency; ODS, ozone-depleting substances.

Annex II

Summary of recommendations for each technology listed in annex I[a]

A written summary of the recommendations that resulted from the assessment of existing approved technologies and other technologies for possible inclusion in the list of approved technologies is provided below.

1. Approved destruction technologies for ozone-depleting substances and their applicability to HFCs

Cement kilns: At the time of writing, no specific data on destruction and removal efficiency or relevant emissions were available for assessment of HFC destruction against the performance criteria. Cement kilns are recommended as having high potential for applicability to HFC destruction, including HFC-23.

Gaseous/fume oxidation: Given the availability of information on demonstrated destruction of HFCs that meet the performance criteria, gaseous/fume oxidation is recommended for approval for applicability to HFC destruction, including HFC-23, using HFC-23 data as a proxy for other HFCs.

Liquid injection incineration: In 2002, the Task Force on Destruction Technologies (TFDT) reported dioxin/furan emissions data that were higher than the performance criteria for the destruction of ozone-depleting substances. At the time of writing, no data were available to confirm dioxin/furan emissions for HFC-134a destruction, and no data were provided for HFC-23 performance or destruction; therefore, liquid injection incineration is recommended as having high potential for applicability to HFC destruction, including HFC-23.

Municipal solid waste incineration: No dioxin/furan emissions data were available to the 2018 TFDT at the time of writing, and the dioxin/furan emissions were higher than the criteria for ozone-depleting substances as noted in the 2002 TFDT report. Municipal solid waste incineration is recommended as having high potential for applicability to destruction of dilute HFC sources (except for HFC-23), specifically for the destruction of HFC blowing agents in foam.

Porous thermal reactor: Porous thermal reactor is recommended for approval for applicability to HFC destruction, except for HFC-23, for which no data was available for assessment. Porous thermal reactor is recommended as having high potential for applicability to HFC-23 destruction.

Reactor cracking: At the time of writing, no specific emission data for particulates were available for assessment against the performance criteria. Reactor cracking is recommended as having high potential for applicability to HFC destruction, including HFC-23.

Rotary kiln incineration: No HFC performance data is presently available to undertake a performance criteria assessment on rotary kiln incineration; therefore, rotary kiln incineration is recommended as having high potential for applicability to HFC destruction, including HFC-23.

Argon plasma arc: At the time of writing, either emissions data are higher than performance criteria (for CO) or are presently unavailable to undertake a performance criteria assessment; therefore, argon plasma arc is recommended as having high potential for applicability to HFC destruction, including HFC-23.

Inductively coupled radio frequency plasma: Due to insufficient data being available at the time of writing, the 2018 TFDT is unable to assess inductively coupled radio frequency plasma for applicability for HFC destruction.

Microwave plasma: Due to insufficient data being available at the time of writing, the 2018 TFDT is unable to assess microwave plasma for applicability for HFC destruction.

Nitrogen plasma arc: Information available at the time of writing this report indicated that reported particulate and HF emissions are above the performance criteria; therefore, nitrogen plasma arc is recommended as having high potential for applicability to HFC destruction, including HFC-23.

Portable plasma arc: No data were available for HCl and dioxin/furan emissions at the time of writing. Portable plasma arc is recommended as having high potential for applicability to HFC destruction, including HFC-23.

[a] The format has been altered from the original version in the report of the task force.

Chemical reaction with H_2 and CO_2: In the absence of emissions data demonstrating it meets the performance criteria for particulates and dioxins/furans, chemical reaction with H_2 and CO_2 is recommended as having high potential for applicability to HFC destruction, including HFC-23.

Gas phase catalytic de-halogenation: No dioxin/furan emissions data for HFC destruction were available to the 2018 TFDT at the time of writing. Although the 2002 TFDT report noted that the TFDT believed that the dioxin/furan emissions would be comparable to those from rotary kilns, no actual emissions data were available at the time. Gas phase catalytic de-halogenation is recommended as having high potential for applicability to HFC destruction, including HFC-23.

Superheated steam reactor: In the absence of emissions data demonstrating it meets the performance criteria for particulates, superheated steam reactor is recommended as having high potential for applicability to HFC destruction, including HFC-23.

Thermal reaction with methane: Given that insufficient data were available at the time of writing, the 2018 TFDT is unable to assess thermal reaction with methane to confirm its applicability to HFC destruction.

2. *Other technologies for possible inclusion in the list of approved destruction technologies*

Electric heater: Data on particulate emissions that meet the performance criteria are unavailable at this time. Additional destruction and removal efficiency and more elaboration on the measurement of emission results would be useful, noting the general reporting of nil results. Electric heater use is recommended as having high potential for applicability to HFC destruction, including HFC-23.

Fixed hearth incinerator: No other data to assess the technology was provided. Given that insufficient data were available at the time of writing, the 2018 TFDT is unable to assess fixed hearth incinerators for possible inclusion on the list of approved destruction technologies. Also, the operating temperature appears to be lower than recommended in the European Union submission for destruction of HFCs.

Furnaces dedicated to manufacturing: Given that insufficient data were available at the time of writing, the 2018 TFDT is unable to assess furnaces dedicated to manufacturing for possible inclusion on the list of approved destruction technologies.

Thermal decay of methyl bromide: Given that insufficient data were available at the time of writing, the 2018 TFDT is unable to assess thermal decay of methyl bromide for possible inclusion on the list of approved technologies. The Technology and Economic Assessment Panel would welcome data to enable it to complete an assessment of this technology.

Air plasma arc: No other data to assess the technology were provided. Given that insufficient data were available at the time of writing, the 2018 TFDT is unable to assess air plasma arc for possible inclusion on the list of approved destruction technologies.

Alternating current plasma (AC plasma): Given that insufficient data were available at the time of writing, the 2018 TFDT is unable to assess AC plasma arc for possible inclusion on the list of approved destruction technologies.

CO_2 plasma: Given that insufficient data that meets the performance criteria were available at the time of writing, the 2018 TFDT is unable to assess CO_2 plasma arc for possible inclusion on the list of approved destruction technologies.

Steam plasma arc: The 2018 TFDT has been unable to contact the technology owner to verify the earlier assessment for all of the performance criteria. Given that insufficient data were available at the time of writing, the 2018 TFDT is unable to assess steam plasma arc for possible inclusion on the list of approved destruction technologies.

Catalytic destruction: Given that insufficient data were available at the time of writing, the 2018 TFDT is unable to assess catalytic destruction for possible inclusion on the list of approved destruction technologies.

Chlorination/de-chlorination to vinylidene chloride: The submission by the United States of America provided information about the conversion of HFC-152a to vinylidene fluoride (or vinyl fluoride), which is a commercial chemical production process used at chemical production plants in the United States of America, where HFC-152a is either a feedstock or a chemical intermediate. The HFC-152a undergoes a chlorination and de-chlorination process to produce vinylidene fluoride. The technology is part of a chemical manufacturing process and not a destruction process.

Solid alkali reaction: Given that insufficient data were available at the time of writing, the 2018 TFDT is unable to assess solid alkali reaction for possible inclusion on the list of approved destruction technologies.

Annex III

Report of the Technology and Economic Assessment Panel (March 2018) Volume 1

Technology and Economic Assessment Panel decision XXIX/9 Working Group report on hydrochlorofluorocarbons and decision XXVII/5

Executive summary[a]

1. In its decision XXIX/9 on hydrochlorofluorocarbons (HCFCs) and decision XXVII/5, the Twenty-Ninth Meeting of the Parties requested the Technology and Economic Assessment Panel to provide further assessment of the issues related to the phase-out of HCFCs, provided in response to decisions XXVII/5 and XXVIII/8, and requested parties to provide relevant information for use by the Panel in providing the assessment.

2. The Panel appreciates the responses it has received from Armenia, Azerbaijan, Canada, Costa Rica, Japan, Kazakhstan, Mexico, Palau, the Bolivarian Republic of Venezuela and an interested entity in the United States of America, and has incorporated the information where appropriate in the present assessment.

3. With regard to fire protection, the decision XXVIII/8 report estimate remains unchanged, namely that for parties not operating under paragraph 1 of Article 5 (non-Article 5 parties) between 2020 and 2030 (as an upper limit for planning purposes and to assess impacts on the environment), volumes of HCFC-123 (for the production of HCFC-based Blend B) not exceeding 750 tonnes annually could be needed (combined with potential amounts required for servicing, this would imply a total consumption of about 900 tonnes annually, or almost 20 ODP tonnes).

- In fire protection, the earlier decision XXVII/5 report identified an application – aircraft rescue and firefighting at commercial and military airports – where certain requirements may currently only be met through the original halon 1211 or the use of an HCFC product, HCFC Blend B, in jurisdictions where their use is still allowable. On the basis of existing alternatives and current technology options, the Panel considered in its report that there was some likelihood that there might be aircraft rescue and firefighting applications that would continue to need clean agents in the 2020–2030 timeframe that can currently only be met through the supply of halon 1211 or HCFC Blend B. (The Panel noted several new fire extinguishing agents under development that might change the situation in the near future. One zero-ODP agent has recently been evaluated in aircraft rescue and firefighting applications, the results of which had not been published at the time of writing.)

- An HCFC blend was also used in fixed fire protection systems to replace halon 1301. This was particularly true in parties that pursued early action to begin to eliminate halon 1301 in new systems. The blend consists of HCFC-22, HCFC-123 and HCFC-124. The Panel is aware that those systems are still used today in merchant shipping and military systems and are expected to continue until the end of their economic lifetime. While no new HCFC blend systems are expected to be installed today or in the future, there is a need to continue to maintain the systems. Therefore, a small amount of HCFCs will also be needed to supply re-charge of the systems during the period 2020–2030. The Panel does not have sufficient data to project quantities needed for the systems, but would estimate that they would be less than those needed for HCFC Blend B in portable/steaming systems used to replace halon 1211.

- The possibility of meeting fire protection needs for HCFCs through the use of recycled or reclaimed HCFCs was addressed in the previous decision XXVII/5 report and the situation remains the same. Recyclers of firefighting agents and refrigerants report that there are only small quantities of HCFC-123 being recycled at present. The main use of HCFC-123 is as a cleaning agent and as a low-pressure refrigerant in large (centrifugal) chillers. While the small amount being recycled may change as older chillers are phased out and replaced with non-HCFC-123 equipment, at this stage it does not appear that there will be a sufficient quantity of HCFC-123 to meet the

[a] The executive summary has been lightly edited.

potential demand of HCFC Blend B for aircraft rescue and firefighting applications in the period beginning in 2020, assuming that no new agents meet the approval of authorities having jurisdiction for this specific application beginning in 2020. The recyclers also report that there is no technical reason that they are aware of at this time that would prevent them from being able to recycle or reclaim HCFC-123 to appropriate purity levels sufficient for use in HCFC Blend B.

4. Solvent and other niche uses of HCFCs have been considered for non-Article 5 parties between 2020 and 2030. On the basis of the available information, if current solvent and other niche HCFC uses continue beyond 2020, annual use might be around 250–500 tonnes (10s of ODP tonnes). Of that amount, about 50–200 tonnes are estimated for the annual HCFC requirements for existing aerospace or military equipment. The estimated amounts indicate those potentially needed to supply solvent and other niche applications as discussed below. Recycling may be feasible although relevant amounts have not been estimated in the absence of available information.

- The decision XXVIII/8 finding that it is possible that some niche solvent applications, such as aerospace or military, might require small quantities of HCFCs to service existing equipment (e.g., HCFC-121, -122a, -141b and -225ca/cb) remains unchanged.
- The decision XXVIII/8 finding that essential uses for non-Article 5 parties are likely to be required in small quantities for laboratory and analytical uses, and for the research into and development of new substances, remains unchanged.
- There is a possibility that HCFC-225 may be required after 2020 in Japan for a solvent application that coats silicone oil on the surface of the needle/syringe to reduce pain at injection, at a rate of around a few hundred tonnes annually. At this time, the Panel is unaware of other non-Article 5 parties that may have this application.
- Several manufacturing processes use HCFCs as solvents in processes that might be considered similar to process agent uses, and potentially would be impacted by the 2020 control measures for HCFC production and consumption in non-Article 5 parties. Known applications include processes using HCFC-141b and HCFC-225ca/cb as solvents. The total known use of HCFCs in such processes has been revised downwards to about 10 tonnes annually. There is a small possibility that such HCFC use may remain after 2020 if alternatives cannot be found by then. Parties may wish to consider how to treat HCFC solvent uses in processes that are similar to process agent uses in relation to the 2020 control measures under Article 2.
- The Panel has become aware of an aerosol application using HCFCs in the Russian Federation. HCFC-22 and HCFC-141b are used as propellant and solvent respectively in a topical medical aerosol application in quantities of around 20 tonnes per year. With the variety of technically and economically feasible alternatives, HCFCs used in aerosols are unlikely to be justifiable as an essential use in non-Article 5 parties.

UNITED NATIONS

EP

UNEP/OzL.Pro.WG.1/40/3

Distr.: General
6 April 2018

Original: English

United Nations Environment Programme

Open-ended Working Group of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer
Fortieth meeting
Vienna, 11–14 July 2018
Item 3 (a) of the provisional agenda*
Kigali Amendment to the Montreal Protocol to phase down hydrofluorocarbons: data reporting under Article 7 and related issues

Data reporting under Article 7 of the Montreal Protocol, including related issues arising from the Kigali Amendment to the Montreal Protocol to phase down hydrofluorocarbons

Note by the Secretariat

I. Introduction

1. The present note sets out a summary of issues related to data reporting of hydrofluorocarbons (HFCs) under Article 7 of the Montreal Protocol on Substances that Deplete the Ozone Layer. The issues were initially discussed by the Open-ended Working Group of the Parties to the Montreal Protocol at its thirty-ninth meeting[1] and further considered at the Twenty-Ninth Meeting of the Parties.[2] Most of those discussions took place in a contact group that was set up at the thirty-ninth meeting of the Open-ended Working Group and reconvened at the Twenty-Ninth Meeting of the Parties, to address data reporting and related issues, including the following:

(a) Timeline for reporting of baseline data for HFCs by parties operating under paragraph 1 of Article 5 of the Protocol (Article 5 parties);

(b) Trade with non-parties and associated reporting;

(c) Global-warming-potential values for HCFC-141 and HCFC-142;

(d) Process for approving destruction technologies for HFCs;

(e) Revised data reporting forms and associated instructions, including the reporting of mixtures and blends.

* UNEP/OzL.Pro.WG.1/40/1.

[1] See UNEP/OzL.Pro.WG.1/39/2 and UNEP/OzL.Pro.WG.1/39/3, available from http://conf.montreal-protocol.org/meeting/oewg/oewg-39/presession/, and the report of the meeting (UNEP/OzL.Pro.WG.1/39/5), available from http://conf.montreal-protocol.org/meeting/oewg/oewg-39/report/.

[2] See UNEP/OzL.Pro.29/7, available from http://conf.montreal-protocol.org/meeting/mop/cop11-mop29/presession/, and the report of the meeting (UNEP/OzL.Conv.11/7-UNEP/OzL.Pro.29/8), available from http://conf.montreal-protocol.org/meeting/mop/cop11-mop29/report/.

2. Section II of the present note provides a summary of the discussions on the issues that were addressed and concluded, namely destruction technologies for HFCs, listed in paragraph 1 above as item (d), and trade with non-parties and associated reporting, listed in paragraph 1 above as item (b).

3. Section III of the present note provides the status of discussions on issues that still require further discussion, listed in paragraph 1 above as items (a), (c), and (e).

4. Section IV of the present note provides information on the development by the Secretariat of an online reporting tool for use by parties to submit their annual Article 7 data reports.

5. Annex I to the present note provides a draft text from the co-chairs of the contact group on the timeline for reporting of baseline data for HFCs by Article 5 parties for the consideration of the parties (see paragraph 14).

6. Annex II to the present note contains the proposed Article 7 data reporting forms (questionnaire and data forms 1 to 6, on imports, exports, production, destruction, non-party trade and emissions of controlled substances). Appendix I to annex II to the present note sets out the associated instructions and guidelines for data reporting; appendix II sets out information associated with reporting other than Article 7 reporting; and appendix III sets out information on reporting under the exemption for high-ambient-temperature parties (instructions and data forms 7 and 8 on consumption and production). In more detail, the appendices are structured as follows:

(a) Appendix I: Data reporting instructions and guidelines, split into sections as follows:

(i) Section 1: Introduction;

(ii) Section 2: Reporting of data and clarifications associated with Article 7 of the Montreal Protocol;

(iii) Section 3: General instructions;

(iv) Section 4: Definitions;

(v) Section 5: Instruction I on data on imports of controlled substances (data form 1);

(vi) Section 6: Instruction II on data on exports of controlled substances (data form 2);

(vii) Section 7: Instruction III on data on production of controlled substances (data form 3);

(viii) Section 8: Instruction IV on data on destruction of controlled substances (data form 4);

(ix) Section 9: Instruction V on data on imports from and exports to non-parties (data form 5);

(x) Section 10: Instruction VI on data on emissions of Annex F, Group II substance – HFC-23 (data form 6);

(xi) Section 11: Illustrative list of mixtures containing controlled substances;

(b) Appendix II: Reporting provisions and clarifications associated with reporting of information other than Article 7 reporting;

(c) Appendix III: Reporting on consumption and production under the exemption for high-ambient-temperature parties. The appendix includes the following sections:

(i) Section 1: Instruction VII on data on consumption (imports) under the exemption for high-ambient-temperature parties (data form 7);

(ii) Section 2: Instruction VIII on data on production under the exemption for high-ambient-temperature parties (data form 8).

7. After the co-chairs presented their report on the outcome of the contact group deliberations to the Twenty-Ninth Meeting of the Parties, the parties agreed that data reporting issues would be included in the agenda of the fortieth meeting of the Open-ended Working Group and that the Working Group would decide how best to proceed thereafter.

II. Issues addressed and concluded

A. Process for approving destruction technologies for HFCs

8. The discussions in the contact group at the Twenty-Ninth Meeting of the Parties resulted in the adoption of decision XXIX/4. The information on progress in the implementation of decision XXIX/4 is contained in document UNEP/OzL.Pro.WG.1/40/2.

B. Trade with non-parties and associated reporting

9. During the discussion in the contact group at the Twenty-Ninth Meeting of the Parties, there was general agreement that for HFCs, the issue of trade with non-parties would only apply from 1 January 2033 onwards, and hence there was no need to report under Article 7 on trade with non-parties before that date. It was agreed that HFCs would be excluded from the requirement to report on trade with non-parties, and consequently that all references to Annex F substances (HFCs) should be deleted from the data reporting forms, and appropriate text should be included therein to guide the parties and the Secretariat accordingly. The deletion has been effected in data form 5, set out in annex II to the present note, and in the associated instructions V, set out in section 9 of appendix I to annex II to the present note (see section III, subsection C below).

III. Issues for further consideration by the parties

A. Timeline for reporting of baseline data for HFCs by parties operating under paragraph 1 of Article 5 (Article 5 parties)

10. Following the adoption of the Kigali Amendment, paragraph 2 of Article 7 of the Protocol requires that each party operating under paragraph 1 of Article 5 (Article 5 party) provide to the Secretariat statistical data on its production, imports and exports of controlled substances in Annex F for the baseline years (2020–2022 for group 1 parties[3] and 2024–2026 for group 2 parties[4]), or best estimates of such data where actual data are not available, not later than three months after the date when the provisions set out in the Protocol with regard to those substances enter into force for that party.

11. Based on that paragraph, Article 5 parties that have ratified the Kigali Amendment, and those that ratify the amendment before the end of 2022 for group 1 parties and before the end of 2026 for group 2 parties, could be required to report some or all of their respective baseline data before the data actually become available. As at the date of the present note, several Article 5 parties have already ratified the Kigali Amendment, which will enter into force on 1 January 2019.

12. During the discussions that took place in the contact group at the Twenty-Ninth Meeting of the Parties, there was general agreement that Article 5 parties that ratify the Kigali Amendment early should report their baseline data within six or nine months after each relevant baseline year, and a proposal was made to allow reporting of the baseline data at the end of the baseline period.[5]

13. A suggestion that had been made previously was reiterated, namely to include a compliance deferral text in the decision on this issue, which would prevent the delayed reporting of the baseline data resulting in non-compliance with the Protocol in respect of data reporting. Reference was made to decision XV/12, which provided compliance deferral for countries that used over 80 per cent of their consumption of methyl bromide on high-moisture dates until alternatives had become available. Similar reference was made to paragraph 36 of decision XXVIII/2,[6] which provides for a deferral in respect of high-ambient-temperature countries. One party indicated however that if the decision text could be clear on the reporting requirements, there might not be a need for deferral.

---

[3] All Article 5 parties except for the 10 parties listed in footnote 4 to the present note.

[4] Bahrain, India, Iran (Islamic Republic of), Iraq, Kuwait, Oman, Pakistan, Qatar, Saudi Arabia and the United Arab Emirates.

[5] The Secretariat notes that under paragraph 3 of Article 7 of the Protocol, parties that ratify the Protocol will be required to report annual data not later than nine months after the end of the year to which the data relate.

[6] Paragraph 36 of decision XXVIII/2 states that "the Implementation Committee under the Non-Compliance Procedure of the Montreal Protocol and the Meeting of the Parties should, for 2025 and 2026, defer consideration of the hydrochlorofluorocarbon compliance status of any party operating under a high-ambient-temperature exemption in cases where it has exceeded its allowable consumption or production levels due to its HCFC-22 consumption or production for the sub-sectors listed in appendix I to the present decision, on the condition that the party concerned is following the phase-out schedule for consumption and production of hydrochlorofluorocarbons for other sectors and has formally requested a deferral through the Secretariat".

14. The contact group concluded that there was general agreement on the concept of allowing Article 5 parties that ratify early to report their HFC baseline data at a later date than that specified in paragraph 2 of the Protocol. Subsequently, the co-chairs were tasked with preparing some text capturing the key points and options to be considered by the parties through a decision. A draft text from the co-chairs for the consideration of the parties is outlined in annex I to the present note.

B. Global-warming-potential values for HCFC-141 and HCFC-142

15. The Kigali Amendment introduced global-warming-potential (GWP) values for 8 of the 40 HCFCs listed in Annex C of the Protocol. A provision was included in Annex C stating that for substances for which no GWP value is indicated, the default value zero applies until a GWP value is determined by means of the procedure foreseen in paragraph 9 (a) (ii) of Article 2 of the Protocol.[7]

16. The Secretariat reported to the Twenty-Ninth Meeting of the Parties[8] that it had reviewed the data submissions for 1989 for a few of the 10 parties[9] whose baseline data included HCFC-141 and HCFC-142, namely Canada, the European Union, France, Japan and Sweden. Based on that review, the Secretariat confirmed that those parties had reported HCFC data for 1989 before the Fifth Meeting of the Parties in 1993, and they had used data reporting forms adopted in 1991 by the Third Meeting of the Parties. Those forms did not list HCFC-141b and HCFC-142b in the list of substances to be reported, and therefore those parties could only report HCFC-141 and HCFC-142 respectively. The Secretariat therefore deemed it likely that the data on HCFC-141 and HCFC-142 reported by those parties for 1989 pertained to the most commercially viable isomers of those substances, namely HCFC-141b and HCFC-142b, for which GWP values are assigned.

17. During the discussions in the contact group, one of the parties affected by the issue pointed out that it had only used HCFC-141b and HCFC-142b in the past, hence the inaccuracies in the reporting and recording of HCFC-141 and HCFC-142 were due to the limitations of the forms available at the time. It was suggested that the parties affected would not request changes to their past baseline, but instead the quantities reported as HCFC-141 and HCFC-142 would be considered as HCFC-141b and HCFC-142b respectively for the purpose of calculating HFC baselines.

18. There was a request for clarification on the difference between this situation and that of parties requesting baseline data changes that are usually considered by the Implementation Committee prior to approval. The president of the Implementation Committee explained that the latter related to situations in which the reported data was incorrect and needed correction, while the situation under consideration related to data correctly reported but incorrectly recorded as a result of the limitations of the reporting forms.

19. It was agreed in the contact group that parties would engage in bilateral consultations on the matter. The contact group also agreed that the matter did not require a decision and that a clarification within a meeting report should suffice.

20. During the discussions, one party raised a separate issue by pointing out that there had been errors in the global-warming-potential values of the common isomers of HCFC-123 and HCFC-124, which had been transposed incorrectly in the Kigali Amendment. The party stated that the parties would provide guidance to the Secretariat on the matter.

C. Revised data reporting forms and associated instructions, including the reporting of mixtures and blends

21. The need to review and update the data reporting forms, including the associated instructions and guidelines, arose following the adoption of the Kigali Amendment, which introduced new reporting obligations in relation to HFCs.

22. The Secretariat had prepared an initial set of revised data reporting forms, as well as an updated version of the associated instructions and guidelines, for consideration by the Open-ended Working Group at its thirty-ninth meeting. The contact group on data reporting and related issues considered the proposed forms, and various suggestions were made for improvements. Parties provided the

[7] Paragraph 9 (a) (ii) of Article 2 of the Montreal Protocol states that "based on the assessments made pursuant to Article 6, the Parties may decide whether adjustments to the global warming potentials specified in Group 1 of Annex A, Annex C and Annex F should be made and, if so, what the adjustments should be."

[8] UNEP/OzL.Pro.29/7, available from http://conf.montreal-protocol.org/meeting/mop/cop11-mop29/presession/.

[9] The 10 parties are Canada, European Union, France, Japan, Malaysia, Norway, the Russian Federation, Sweden, Switzerland and Ukraine.

Secretariat with additional and more comprehensive comments both in writing and orally after that meeting.

23. The Secretariat subsequently made revisions to the reporting forms and the associated instructions and guidelines based on the feedback and input received from the parties, and presented the revised forms for consideration by the Twenty-Ninth Meeting of the Parties. Discussions took place mostly in the contact group, where various issues were considered.

1. Reporting of blends

24. The issue of allowing the reporting of blends was generally accepted, even though some parties indicated that they preferred to report pure substances. Some parties indicated that they were comfortable with the new proposed revised data reporting forms because they allowed flexibility. Several parties requested that the forms for reporting country programme data needed to similarly allow the reporting of blends, and the Secretariat of the Multilateral Fund for the Implementation of the Montreal Protocol indicated that they would revise the country programme reporting forms based on what parties had agreed. Some parties requested that tools be developed to automatically manage the reporting of blends. Those tools are under preparation.

2. Harmonized System codes for HFC-blends

25. On the issue of Harmonized System (HS) codes for HFC blends, it was reported that an application had been made to the World Customs Organization to consider assigning HS codes for the most commonly traded HFC blends and mixtures. The Harmonized System Committee of the World Customs Organization considered the issue at its meeting held in Brussels on 9 March 2018, but was unable to conclude its discussion on the classification of HFC mixtures owing to concerns that the proposed structure of the new HS codes did not properly harmonize the products proposed in the subheadings under Chapter 38 of the HS nomenclature. The Committee referred the matter to the Harmonized System Review Subcommittee, which will meet in Brussels in June 2019 to deliberate on the issue. The Secretariat will provide an update to the Meeting of the Parties on the outcome of the deliberations of the Subcommittee.

3. Reporting on HFC-23 emissions

26. On the issue of reporting on HFC-23 emissions,[10] one party requested that the whole of form 6 on reporting of HFC-23 emissions be put in square brackets, arguing that emissions were to be reported to the United Nations Framework Convention on Climate Change. There was also discussion on whether optional reporting, currently included in the proposed data reporting forms (relevant columns are shaded light grey in forms 1, 2, 5 and 6), needed to be deleted or separated from the mandatory reporting requirements.

4. Reporting of HFC-23 by-production

27. On the issue of reporting on HFC-23 by-production, it was clarified that any by-production that was captured needed to be reported on data form 3 on production, as had been done in a similar way in the past for the reporting of by-production of carbon tetrachloride. Data forms 3 and 6 and their associated instructions in sections 7 and 10 respectively of appendix I to annex II to the present report have been revised accordingly.

5. Reporting information on trade with non-parties

28. With respect to reporting information on non-party trade, it was agreed that all references to annex F substances (HFCs) in data form 5, set out in annex II to the present note, and the associated instructions set out in section 9 of appendix I to annex II to the present note (see section I above) would be deleted.

6. Conclusion

29. The contact group agreed that more time was required to consider the data reporting forms and their associated instructions and guidelines before finalization.

[10] Paragraph 3 ter of Article 7 of the Montreal Protocol as amended by the Kigali Amendment states that "each Party shall provide to the Secretariat statistical data on its annual emissions of Annex F, Group II, controlled substances per facility in accordance with paragraph 1 (d) of Article 3 of the Protocol".

IV. Development of an online reporting tool for Article 7 data

30. The Secretariat has been working on the development of an online reporting tool for use by parties to submit their annual Article 7 data reports. Although initial preparatory work and development of the tool has been undertaken, the Secretariat has decided to include in the online tool the revised data forms that are expected to be approved by the parties. Once those forms are approved, the Secretariat will be able to complete the work on reporting.

Annex I

Timelines for reporting of baseline data for HFCs by parties operating under paragraph 1 of Article 5 (Article 5 parties)

Draft text from the co-chairs of the contact group

Points to consider

(i) Regarding the reporting of baseline data for the HFC phase-down, paragraph 2 of Article 7 as amended by the Kigali Amendment includes provisions requiring each party to report statistical data on production, imports and exports of each HFC listed in Annex F for the relevant years as follows:

- 2011 to 2013 for parties not operating under paragraph 1 of Article 5;
- 2020 to 2022 for Article 5, group 1 parties;[1]
- 2024 to 2026 for Article 5, group 2 parties;[2]

or the best possible estimates where actual data are not available, **not later than three months after the date when the provisions set out in the Montreal Protocol with regard to the substances in Annex F enter into force for that party (emphasis added).**

(ii) The data reported for the years specified above contribute to the calculation of baselines for complying with the HFC phase-down.

(iii) Compliance with paragraph 2 of Article 7 would require Article 5 parties that ratify the Kigali Amendment before the end of 2022 for group 1 parties and before the end of 2026 for group 2 parties to report estimates of some or all of their respective baseline data for hydrofluorocarbons before the actual data become available.

(iv) Parties that submit best possible estimates of their consumption and production for each baseline year in advance of the baseline years, and that subsequently want to change that data once data on actual consumption becomes available, would need to have their requests considered by the Implementation Committee under the Non-Compliance Procedure for the Montreal Protocol and the Meeting of the Parties, as required by paragraph 5 of decision XIII/15. It would be advisable to avoid such a situation as much as possible.

(v) There is general agreement that it would be more pragmatic and practical for Article 5 parties to provide actual baseline data rather than provide uncertain and imprecise data projections some years in advance of their respective baseline years. Therefore, it would be desirable that parties clarify when and how Article 5 parties should report actual baseline data for hydrofluorocarbons instead of reporting estimated data for future years.

(vi) This approach would apply only to those Article 5 parties for which the Amendment enters into force before the end of the applicable baseline year or period.

(vii) In considering this issue, it is important for parties to recall that annual reporting of HFC data for the baseline years would still take place as part of the mandatory reporting under paragraph 3 of Article 7 of the Montreal Protocol as amended by the Kigali Amendment. That paragraph stipulates that each party is required to report annual data for hydrofluorocarbons for the year during which the amendment enters into force for that party and for each year thereafter, not later than nine months after the end of the year to which the data relate.

Proposed approach

Proposed option 1

In order to allow Article 5 parties to report actual HFC baseline data, the Implementation Committee and Meeting of the Parties should defer, separately for each baseline year, the consideration of the compliance status, relative to reporting of hydrofluorocarbons under paragraph 2 of Article 7, of any

[1] All Article 5 parties except for the 10 parties listed in footnote 2.

[2] Bahrain, India, Iran (Islamic Republic of), Iraq, Kuwait, Oman, Pakistan, Qatar, Saudi Arabia and the United Arab Emirates.

Article 5 party for which the Kigali Amendment enters into force before the end of the applicable baseline period, until:

(a) [Six][Nine] months after the end of each of the baseline years to which the data relate (i.e., June or September of 2021, 2022 and 2023 for group 1; and June or September of 2025, 2026 and 2027 for group 2); or

(b) [Six][Nine] months after the end of the year during which the Kigali Amendment enters into force for that party (e.g., a party for which the Amendment enters into force in 2021 would have to report baseline data for the baseline years 2020 and 2021 by June or September of 2022 and would have to report baseline data for 2022 by June or September 2023).

Note: This would mean that an Article 5 party that submits its complete data for each baseline year as per the above dates would benefit from a compliance deferral. This deferral does not apply to the reporting obligations under paragraph 3 of Article 7 of the Protocol.

Proposed option 2

In order to allow Article 5 parties to report actual HFC baseline data, the Implementation Committee and Meeting of the Parties should defer the consideration of the compliance status, relative to reporting of hydrofluorocarbons under paragraph 2 of Article 7, of any Article 5 party for which the Kigali Amendment enters into force before the end of the applicable baseline period, until [six][nine] months after the final year of the baseline period (i.e., June or September of 2023 for group 1 and June or September of 2027 for group 2).

Note: This would mean that an Article 5 party that submits its complete data for each baseline year as per the above dates would benefit from a compliance deferral. This deferral does not apply to the reporting obligations under paragraph 3 of Article 7 of the Protocol.

Annex II

Proposed Article 7 data reporting forms and associated instructions and guidelines

Questionnaire

Party:_____ Reporting year:_____

Before beginning the questionnaire, respondents are requested to read the following sections of the data reporting instructions and guidelines document carefully: (a) Section 1: Introduction; (b) Section 3: General instructions; and (c) Section 4: Definitions. Respondents are encouraged to refer to the data reporting instructions and guidelines as necessary when completing the data forms.

Questionnaire

1.1. Did your country **import** CFCs, halons, carbon tetrachloride, methyl chloroform, HCFCs, HBFCs, bromochloromethane, methyl bromide or HFCs in the reporting year?

Yes [ ] No [ ]

If No, ignore data form 1 and go to question 1.2. If Yes, please complete data form 1. Please read **instruction I** (on data on imports of controlled substances) of the data reporting instructions and guidelines document carefully before filling in the form.

1.2. Did your country **export or re-export** CFCs, halons, carbon tetrachloride, methyl chloroform, HCFCs, HBFCs, bromochloromethane, methyl bromide or HFCs in the reporting year?

Yes [ ] No [ ]

If No, ignore data form 2 and go to question 1.3. If Yes, please complete data form 2. Please read **instruction II** (on data on exports of controlled substances) of the data reporting instructions and guidelines document carefully before filling in the form.

1.3. Did your country **produce** CFCs, halons, carbon tetrachloride, methyl chloroform, HCFCs, HBFCs, bromochloromethane, methyl bromide or HFCs in the reporting year?

Yes [ ] No [ ]

If No, ignore data form 3 and go to question 1.4. If Yes, please complete data form 3. Please read **instruction III** (on data on production of controlled substances) of the data reporting instructions and guidelines document carefully before filling in the form.

1.4. Did your country **destroy** any ozone-depleting substances or HFCs in the reporting year?

Yes [ ] No [ ]

If No, ignore data form 4 and go to question 1.5. If Yes, please complete data form 4. Please read **instruction IV** (on data on destruction of controlled substances) of the data reporting instructions and guidelines document carefully before filling in the form.

1.5. Did your country **import from** or **export or re-export to non-parties** in the reporting year?

Yes [ ] No [ ]

If No, ignore data form 5 and go to question 1.6. If Yes, please complete data form 5. Please read **instruction V** (on data on imports from and exports to non-parties) of the data reporting instructions and guidelines document carefully, particularly the definition of non-parties, before filling in the form.

1.6. Did your country generate the substance HFC-23 in the reporting year from any facility that **produces (manufactures) Annex C Group I or Annex F substances**?

Yes [ ] No [ ]

If No, ignore data form 6. If Yes, please complete data form 6. Please read **instruction VI** (on data on emissions of Annex F Group II substance – HFC-23) of the data reporting instructions and guidelines document carefully before filling in the form.

Name of reporting officer: .....

Signature: .....

Designation: .....

Organization: .....

Postal address: .....

Country: .....

Phone: .....

Email: .....

Date: .....

Data form 1 on imports

1. Fill in this form only if your country imported CFCs, halons, carbon tetrachloride, methyl chloroform, HCFCs, HBFCs, bromochloromethane, methyl bromide or HFCs

2. Please read instruction I carefully before filling in this form.

Party: _____

DATA FORM 1

DATA ON IMPORTS

in tonnes[1] (not ODP or CO_2-equivalent tonnes)

Annex A, B, C, E and F substances

Period: January – December 20____

Dataform/2018

(1) Annex/group	*(2) Substance*	*Total quantity imported for all uses*		*(5) Quantity of new substance imported for feedstock uses*	*Quantity of new substance imported for exempted essential, critical or other uses**	
		(3) New	*(4) Recovered and reclaimed*		*(6) Quantity*	*(7) Decision / type of use* or remarks*
A-Group I	CFC-11 ($CFCl_3$)					
	CFC-12 (CF_2Cl_2)					
	CFC-113 ($C_2F_3Cl_3$)					
	CFC-114 ($C_2F_4Cl_2$)					
	CFC-115 (C_2F_5Cl)					
A-Group II	Halon-1211 (CF_2BrCl)					
	Halon-1301 (CF_3Br)					
	Halon-2402 ($C_2F_4Br_2$)					
B-Group I	CFC-13 (CF_3Cl)					
B-Group II	Carbon tetrachloride (CCl_4)					
B-Group III	Methyl chloroform, i.e., 1,1,1-trichloroethane ($C_2H_3Cl_3$)					

Comments:

[1] Tonne = Metric ton.

* Against each substance imported for exempted essential, critical or other uses, please specify the Meeting of the Parties decision that approved the use. Should the column space be insufficient, further information can be provided in the "comments" box above.

(1) *Annex/group*	*(2)* *Substance*	*Total quantity imported for all uses*		*(5)* *Quantity of new substance imported for feedstock uses*	*Quantity of new substance imported for exempted essential, critical or other uses**	
		(3) *New*	*(4)* *Recovered and reclaimed*		*(6)* *Quantity*	*(7)* *Decision / type of use* or remarks*
C-Group I	HCFC-21** ($CHFCl_2$)					
	HCFC-22** (CHF_2Cl)					
	HCFC-31 (CH_2FCl)					
	HCFC-123** ($CHCl_2CF_3$)					
	HCFC-124** ($CHFClCF_3$)					
	HCFC-133 ($C_2H_2F_3Cl$)					
	HCFC-141b** (CH_3CFCl_2)					
	HCFC-142b** (CH_3CF_2Cl)					
	HCFC-225 ($C_3HF_5Cl_2$)					
	HCFC-225ca ($CF_3CF_2CHCl_2$)					
	HCFC-225cb (CF_2ClCF_2CHClF)					
C-Group II	HBFCs					
C-Group III	Bromochloromethane (CH_2BrCl)					
E-Group I	Methyl bromide (CH_3Br)					
					Quantity of new methyl bromide imported to be used for quarantine and pre-shipment applications	

Comments:

Note: As per paragraph 5 bis of Article 2 of the Protocol, any transfer of HCFC consumption by parties not operating under paragraph 1 of Article 5 shall be notified to the Secretariat, no later than the time of the transfer, by each of the parties concerned, stating the terms of such transfer and the period for which it is to apply.

* Against each substance imported for exempted essential, critical or other uses, please specify the Meeting of the Parties decision that approved the use. Should the column space be insufficient, further information can be provided in the "comments" box above.

** Identifies the most commercially viable substances with ozone-depleting-potential (ODP) values listed against them to be used for the purposes of the Protocol.

(1) Annex/group	(2) Substance	Total quantity imported for all uses		(5) Quantity of new substance imported for feedstock uses	Quantity of new substance imported for exempted essential, critical or other uses*	
		(3) New	(4) Recovered and reclaimed		(6) Quantity	(7) Decision / type of use* or remarks
F-Group I	HFC-32 (CH_2F_2)					
	HFC-41 (CH_3F)					
	HFC-125 (CHF_2CF_3)					
	HFC-134 (CHF_2CHF_2)					
	HFC-134a (CH_2FCF_3)					
	HFC-143 (CH_2FCHF_2)					
	HFC-143a (CH_3CF_3)					
	HFC-152 (CH_2FCH_2F)					
	HFC-152a (CH_3CHF_2)					
	HFC-227ea (CF_3CHFCF_3)					
	HFC-236cb ($CH_2FCF_2CF_3$)					
	HFC-236ea (CHF_2CHFCF_3)					
	HFC-236fa ($CF_3CH_2CF_3$)					
	HFC-245ca ($CH_2FCF_2CHF_2$)					
	HFC-245fa ($CHF_2CH_2CF_3$)					
	HFC-365mfc ($CF_3CH_2CF_2CH_3$)					
	HFC-43-10mee ($CF_3CHFCHFCF_2CF_3$)					
F-Group II	HFC-23 (CHF_3)					
Mixtures and blends containing any controlled substance(s) – applicable to all substances, not just HFCs (add additional rows or pages as required for blends not listed below)						
R-404A (HFC-125 = 44%, HFC-134a = 4%, HFC-143a = 52%)						
R-407A (HFC-32 = 20%, HFC-125 = 40%, HFC-143a = 40%)						
R-407C (HFC-32 = 23%, HFC-125 = 25%, HFC-143a = 52%)						
R-410A (HFC-32 = 50%, HFC-125 = 50%)						
R-507A (HFC-125 = 50%, HFC-143a = 50%)						
R-508B (HFC-23 = 46%, PFC-116 = 54%)						

Comments:

Note: When reporting blends, reporting of controlled substances should not be duplicated. Parties may choose to report imports of individual controlled substances, total quantities of blends imported, or a combination of both, provided that the amounts of imported controlled substances are not reported more than once. If a non-standard blend not listed in section 11 of the data reporting instructions and guidelines is to be reported, please indicate the percentage by weight of each constituent controlled substance of the mixture being reported in the "remark" column or in the "comments" box above.

* Against each substance imported for exempted essential, critical, high-ambient-temperature or other uses, please specify the Meeting of the Parties decision that approved the use. Should the column space be insufficient, further information can be provided in the "comments" box above. In case of multiple exemptions per substance for some of the controlled substances, multiple entries may be used for those substances to report on those exemptions.

Annex to DATA FORM 1 - Exporting parties for quantities reported as imports **Dataform/2018**

Note: This annex is excluded from the reporting requirements under Article 7 of the Protocol, and the information in the annex is to be provided on a voluntary basis (decision XXIV/12)

(1) Substance	*(2) Exporting party for quantities reported as imports*	*Total quantity imported for all uses*		*(5) Quantity of new substance imported for feedstock uses*	*Quantity of new substance imported for exempted essential, critical, high-ambient-temperature or other uses**	
		(3) New	*(4) Recovered and reclaimed*		*(6) Quantity*	*(7) Decision / type of use* or remarks*
Methyl bromide (CH_3Br)						
					Quantity of new methyl bromide imported to be used for quarantine and pre-shipment applications within your country	

Comments:

* Against each substance imported for exempted essential, critical, high-ambient-temperature or other uses, please specify the Meeting of the Parties decision that approved the use. Should the column space be insufficient, further information can be provided in the "comments" box above.

Data form 2 on exports

1. Fill in this form only if your country exported or re-exported CFCs, halons, carbon tetrachloride, methyl chloroform, HCFCs, HBFCs, bromochloromethane, methyl bromide or HFCs

2. Please read instruction II carefully before filling in this form.

DATA FORM 2 **Dataform/2018**

DATA ON EXPORTS*

in tonnes[1] (not ODP or CO_2-equivalent tonnes)

Annex A, B, C, E and F substances

Party: _____ Period: January – December 20____

(1) Substance	*(2) Country of destination of exports***	*Total quantity exported for all uses*		*(5) Quantity of new substance exported for feedstock****	*Quantity of new substance exported for exempted essential, critical, high-ambient-temperature or other uses*****	
		(3) New	*(4) Recovered and reclaimed*		*(6) Quantity*	*(7) Decision / type of use***** or remarks*
Methyl bromide (CH_3Br)					*Quantity of new methyl bromide exported to be used for quarantine and pre-shipment applications*	
Comments:						

[1] Tonne = Metric ton.

Note: If a non-standard blend not listed in section 11 of the data reporting instructions and guidelines is to be reported, please indicate the percentage by weight of each constituent controlled substance of the mixture being reported in the "remark" column or in the "comments" box above.

* Includes re-exports. Ref. decisions IV/14 and XVII/16, paragraph 4.

** Applicable to all substances, including those contained in mixtures and blends.

*** Do not deduct from total production in column 3 of data form 3 (data on production).

**** Against each substance exported for exempted essential, critical, high-ambient-temperature or other uses, please specify the Meeting of the Parties decision that approved the use. Should the column space be insufficient, further information can be provided in the "comments" box above.

Data form 3 on production

1. Fill in this form only if your country produced CFCs, halons, carbon tetrachloride, methyl chloroform, HCFCs, HBFCs, bromochloromethane, methyl bromide or HFCs

2. Please read instruction III carefully before filling in this form

Party: _____

DATA FORM 3 **Dataform/2018**

DATA ON PRODUCTION

in tonnes[1] (not ODP or CO_2-equivalent tonnes)

Annex A, B, C, E and F substances

Period: January – December 20____

(1) Annex/group	*(2) Substance*	*(3) Total production for all uses*	*(4) Production for feedstock uses within your country*	*Production for exempted essential, critical or other uses within your country**		*(7) Production for supply to Article 5 countries in accordance with Articles 2A-2H and 5*
				(5) Quantity	*(6) Decision / type of use* or remarks*	
A-Group I	CFC-11 ($CFCl_3$)					This column is no longer applicable to Annex A and B substances (CFCs, halons, CCl_4 and methyl chloroform)
	CFC-12 (CF_2Cl_2)					
	CFC-113 ($C_2F_3Cl_3$)					
	CFC-114 ($C_2F_4Cl_2$)					
	CFC-115 (C_2F_5Cl)					
A-Group II	Halon-1211 (CF_2BrCl)					
	Halon-1301 (CF_3Br)					
	Halon-2402 ($C_2F_4Br_2$)					
B-Group I	CFC-13 (CF_3Cl)					
B-Group II	Carbon tetrachloride (CCl_4)					
B-Group III	Methyl chloroform, i.e., 1,1,1-trichloroethane ($C_2H_3Cl_3$)					

Comments:

[1] Tonne = Metric ton.

Note: As per paragraph 5 of Article 2 of the Protocol, any transfer of production shall be notified to the Secretariat, no later than the time of the transfer, by each of the parties concerned, stating the terms of such transfer and the period for which it is to apply. By-production that is captured, whether for destruction, feedstock or any other use, shall be reported as production in this data form. Production that is converted to other substances shall be reported as production for feedstock uses in this data form.

* Against each substance produced for exempted essential, critical or other uses, please specify the Meeting of the Parties decision that approved the use. Should the column space be insufficient, further information can be provided in the "comments" box above.

(1) Annex/group	(2) Substance	(3) Total production for all uses	(4) Production for feedstock uses within your country	Production for exempted essential, critical or other uses within your country*		(7) Production for supply to Article 5 countries in accordance with Articles 2A-2H and 5
				(5) Quantity	(6) Decision / type of use* or remarks	
C-Group I	HCFC-21** ($CHFCl_2$)					
	HCFC-22** (CHF_2Cl)					
	HCFC-31 (CH_2FCl)					
	HCFC-123** ($CHCl_2CF_3$)					
	HCFC-124** ($CHFClCF_3$)					
	HCFC-133 ($C_2H_2F_3Cl$)					
	HCFC-141b** (CH_3CFCl_2)					
	HCFC-142b** (CH_3CF_2Cl)					
	HCFC-225 ($C_3HF_5Cl_2$)					
	HCFC-225ca ($CF_3CF_2CHCl_2$)					
	HCFC-225cb (CF_2ClCF_2CHClF)					
C-Group II	HBFCs					This column is no longer applicable to Annex/group C/II, C/III and E/I substances (HBFCs, BCM and methyl bromide)
C-Group III	Bromochloromethane (CH_2BrCl)					
E-Group I	Methyl bromide (CH_3Br)			*Total quantity of new methyl bromide produced for quarantine and pre-shipment applications within your country and for export*		

Comments:

Note: As per paragraph 5 of Article 2 of the Protocol, any transfer of production shall be notified to the Secretariat, no later than the time of the transfer, by each of the parties concerned, stating the terms of such transfer and the period for which it is to apply.

* Against each substance produced for exempted essential, critical or other uses, please specify the Meeting of the Parties decision that approved the use. Should the column space be insufficient, further information can be provided in the "comments" box above. By-production that is captured, whether for destruction, feedstock or any other use, shall be reported as production in this data form. Production that is converted to other substances shall be reported as production for feedstock uses in this data form.

** Identifies the most commercially viable substances with ozone-depleting-potential (ODP) values listed against them to be used for the purposes of the Protocol.

(1) Annex/group	*(2) Substance*	*(3) Total production for all uses*	*(4) Production for feedstock uses within your country*	*Production for exempted essential, critical or other uses within your country**		*(7) Production for supply to Article 5 countries in accordance with Articles 2A-2H and 5*
				(5) Quantity	*(6) Decision / type of use* or remarks*	
F-Group I	HFC-32 (CH_2F_2)					**This column is not applicable to Annex F substances (HFCs)**
	HFC-41 (CH_3F)					
	HFC-125 (CHF_2CF_3)					
	HFC-134 (CHF_2CHF_2)					
	HFC-134a (CH_2FCF_3)					
	HFC-143 (CH_2FCHF_2)					
	HFC-143a (CH_3CF_3)					
	HFC-152 (CH_2FCH_2F)					
	HFC-152a (CH_3CHF_2)					
	HFC-227ea (CF_3CHFCF_3)					
	HFC-236cb ($CH_2FCF_2CF_3$)					
	HFC-236ea (CHF_2CHFCF_3)					
	HFC-236fa ($CF_3CH_2CF_3$)					
	HFC-245ca ($CH_2FCF_2CHF_2$)					
	HFC-245fa ($CHF_2CH_2CF_3$)					
	HFC-365mfc ($CF_3CH_2CF_2CH_3$)					
	HFC-43-10mee ($CF_3CHFCHFCF_2CF_3$)					
F-Group II	HFC-23 (CHF_3)					

Comments:

Note: As per paragraph 5 of Article 2 of the Protocol, any transfer of production shall be notified to the Secretariat, no later than the time of the transfer, by each of the parties concerned, stating the terms of such transfer and the period for which it is to apply. By-production that is captured, whether for destruction, feedstock or any other use, shall be reported as production in this data form. Production that is converted to other substances shall be reported as production for feedstock uses in this data form.

* Against each substance produced for exempted essential, critical, high-ambient-temperature or other uses, please specify the Meeting of the Parties decision that approved the use. Should the column space be insufficient, further information can be provided in the "comments" box above.

Data form 4 on destruction of controlled substances

1. Fill in this form only if your country destroyed CFCs, halons, carbon tetrachloride, methyl chloroform, HCFCs, HBFCs, bromochloromethane, methyl bromide or HFCs

2. Please read instruction IV carefully before filling in this form

Party: _____

DATA FORM 4

DATA ON QUANTITY OF SUBSTANCES DESTROYED

in tonnes[1] (not ODP or CO_2-equivalent tonnes)

Annex A, B, C, E and F substances

Period: January – December 20____

Dataform/2018

(1) *Substance*	*(2)* *Quantity destroyed*	*(3)* *Remarks*

Comments:

[1] Tonne = Metric ton.

Note: If the composition of a destroyed mixture is known, please indicate the percentage by weight of each constituent controlled substance of the mixture being reported in the remarks or comments section of the form or indicate a standard mixture or blend as listed in section 11 of the data reporting instructions and guidelines.

Data form 5 on trade with non-parties

1. Fill in this form only if your country imported or exported CFCs, halons, carbon tetrachloride, methyl chloroform, HCFCs, HBFCs, bromochloromethane or methyl bromide from or to non-parties

2. Please read instruction V carefully before filling in this form.

Party: _____

DATA FORM 5 **Dataform/2018**

DATA ON IMPORTS FROM AND/OR EXPORTS TO NON-PARTIES*

in tonnes[1] (not ODP or CO_2-equivalent tonnes)

Annex A, B, C and E substances

Period: January – December 20____

(1) *Substance*	*(2)* *Exporting party for quantities reported as imports* OR *Country of destination of exports*	*Quantity of imports from non-parties**		*Quantity of exports to non-parties**		*(7)* *Remarks*
		(3) *New imports*	*(4)* *Recovered and reclaimed imports*	*(5)* *New exports*	*(6)* *Recovered and reclaimed exports*	

Comments:

[1] Tonne = Metric ton.

Note: If a non-standard blend not listed in section 11 of the data reporting instructions and guidelines is to be reported, please indicate the percentage by weight of each constituent controlled substance of the mixture being reported in the "remark" column or in the "comments" box above.

* See definition of "non-parties" in Instruction V.

[Data form 6 on HFC-23 emissions

1. Fill in this form only if your country generated HFC-23 from any facility that produced (manufactured) Annex C Group I or Annex F substances

2. Please read instruction VI carefully before filling in this form

DATA FORM 6

Dataform/2018

DATA ON QUANTITY OF EMISSIONS OF HFC-23 FROM FACILITIES MANUFACTURING ANNEX C GROUP I OR ANNEX F SUBSTANCES

in tonnes[1] (not ODP or CO_2-equivalent tonnes)

Party: _____

Period: January – December 20____

(1) Facility name or identifier	*(2) Emissions of HFC-23 (amount)*	*(3) Remarks*

Comments:

[1] Tonne = Metric ton.

Note: By-production that is captured, whether for destruction, feedstock or any other use, shall be reported as production in data form 3. Amount converted to other substances shall be reported as production for feedstock uses in data form 3.

Annex to data form 6 on HFC-23 emissions **Dataform/2018**

Note: This annex is excluded from the reporting requirements under Article 7 of the Protocol, and the information in the annex is to be provided on a voluntary basis.

Information required under paragraph 3 ter of Article 7			***Optional information:* the information in these columns is to be provided on a voluntary basis***	
(1) *Facility name or identifier*	*(2)* *Emissions of HFC-23 (amount)*	*(3)* *Remark*	*(4)* *Substance (HCFC or HFC) manufactured (produced) by the facility*	*(5)* *Amount manufactured (produced) by the facility (tonnes)*

Appendix I

Data reporting instructions and guidelines

Section 1: Introduction

1.1 The attached data forms have been designed to make reporting easier for the parties. The reporting is prescribed by Article 7 of the Montreal Protocol and further described in various decisions of the Meeting of the Parties. Some decisions introduce additional items that parties may report voluntarily.

1.2 The data reported in accordance with the data forms will be used to determine the calculated levels of production and consumption, upon which the control measures are based.

1.3 The major features of the forms are as follows:

(a) Six separate data forms are provided for imports, exports, production, destruction, trade with non-parties and emissions of controlled substances. Please use only those data forms applicable to your country and ignore the other forms, after ticking off the respective "No" box in the questionnaire. For example, many parties only import and do not export, produce, destroy or trade with non-parties in any of the substances. If this is the case, please use only data form 1 on imports and ignore the other forms, after ticking off the "No" boxes for questions 1.2 – 1.6 on the questionnaire.

(b) A row has been provided for each of the substances in Annex A and Annex F. However, for categories of "Other CFCs" (Annex B Group I) and HCFCs (Annex C Group I), the form is made shorter by providing rows only for substances commonly reported by parties in the past. A few blank rows are provided for more substances, if needed. HBFCs and BCM (Annex C Groups II and III) have already been phased out by all parties; hence, one blank row has been provided for them as a formality only. You may use the computerized forms supplied by the Secretariat or paper forms. Parties who use the computerized forms can easily add more rows as needed; parties using paper forms are free to add pages as required.

(c) The following are some of the different categories of uses of controlled substances that need to be reported:

- Feedstock uses for all substances
- Essential uses, including laboratory and analytical uses, for substances as approved by the Meeting of the Parties from time to time
- Quarantine and pre-shipment applications for methyl bromide
- Process agent uses for specific applications as approved in table A of decision X/14 and updated periodically by the Meeting of the Parties
- Critical or emergency uses of methyl bromide as approved from time to time
- Exemption for high-ambient-temperature parties

It is necessary for each party to specify how much of its production, export or import is used for these categories. Where applicable, the Secretariat will deduct these quantities from the total figures. Provision is made in the data forms for these categories. For exempted essential, critical, high-ambient-temperature or other uses, provision has also been made for parties to specify the decision of the Meeting of the Parties that approved the use.

(d) The same forms can be used for reporting for baseline years and other years. It should be noted that paragraphs 1 and 2 of Article 7 of the Montreal Protocol both provide that the parties may submit the best possible estimates of data for the base years if actual data are not available.

(e) The basis for reporting requirements and definitions are given in sections 2 and 4 below respectively.

(f) A "remarks" column has been provided at the end of each row, and a "comments" box has been provided at the end of each form, for parties to include any additional information that they believe would assist the Secretariat in processing their data report.

Section 2: Reporting of data and clarifications associated with Article 7 of the Montreal Protocol

Reporting set out under Article 7 of the Montreal Protocol, and related requests pursuant to decisions by the Meeting of the Parties

Basis for reporting under Article 7	*Information to be provided*
Annual data reporting under Article 7	**(reported annually)**
(a) Article 7 paragraphs 3, 3 bis and 3 ter	Statistical data on production of each of the controlled substances
	Amounts used for feedstock
	Amounts destroyed by technologies approved by the parties
	Imports from and exports to parties and non-parties respectively
	Statistical data on the amount of methyl bromide used for quarantine and pre-shipment applications
	Statistical data on imports and exports of recycled halons and HCFCs
	Statistical data on emissions of HFC-23 per facility in accordance with paragraph 1 (d) of Article 3 of the Protocol
(b) To verify implementation of Articles 2A to 2F and 2H	Excess production above the control limit in order to satisfy the basic domestic needs of parties operating under paragraph 1 of Article 5 (Article 5 parties)
(c) Decision IV/11, paragraph 3	Actual quantities of controlled substances destroyed
(d) Decision VII/30, paragraph 1	Volumes of controlled substances imported for feedstock uses by importing countries
(e) Decision XI/13, paragraph 3	Amount of methyl bromide used for quarantine and pre-shipment applications
(f) Decision XVII/16, paragraph 4, and decision VII/9, paragraph 4	Types, quantities and destinations of exports of all controlled substances
(g) Decision XXIV/12, paragraph 1	Types, quantities and exporting party for quantities reported as imports
Baseline data reporting under Article 7	**(reported once)**
Article 7, paragraphs 1 and 2	Statistical data on production, imports and exports of each of the controlled substances in: - Annex A, for the year 1986 - Annex B and Groups I and II of Annex C, for the year 1989 - Annex E, for the year 1991 - Annex F: by parties not operating under paragraph 1 of Article 5, for the years 2011 to 2013; by Article 5, group 1 parties, for the years 2020 to 2022; and by Article 5, group 2 parties, for the years 2024 to 2026 or the best possible estimates of such data where actual data are not available, within three months of entry into force

Definitions and clarifications on calculating production and consumption using the reported data

Basis for clarification	*Guidance provided*
a) Article 1, paragraph 5	Subtract the amount destroyed by technologies approved by the parties and the amount entirely used as feedstock in the manufacture of other chemicals from production. The amount recycled and reused is not to be considered as production.
b) Article 1, paragraph 6	"Consumption" means production plus imports minus exports of controlled substances.
c) Article 2H, paragraph 6	Calculated levels of consumption and production for methyl bromide shall not include the amounts used for quarantine and pre-shipment applications.
d) Article 3, paragraph 1 (c)	Beginning on 1 January 1993, any export of controlled substances to non-parties shall not be subtracted in calculating the consumption level of the exporting party. Note that this does not apply to HFCs.

Basis for clarification	*Guidance provided*
e) Decision IV/24, paragraph 2	The import and export of recycled and used controlled substances should not be taken into account for calculating consumption (except when calculating the base year consumption under paragraph 1 of Article 5 of the Protocol).
f) Decisions X/14, paragraph 3	Quantities of controlled substances produced or imported for the purpose of being used as process agents in plants and installations in operation before 1 January 1999 should not be taken into account in the calculation of production and consumption from 1 January 2002 onwards.
g) Decision VII/30, paragraph 1	The amount of controlled substances produced and exported for the purpose of being entirely used as feedstock in the manufacture of other chemicals in importing countries should not be the subject of the calculation of production or consumption in exporting countries.
h) Decision VII/30, paragraph 2	The amount of controlled substances entirely used as feedstock in the manufacture of other chemicals should not be the subject of calculation of consumption in importing countries.

Section 3: General instructions

3.1 Parties are requested to report the production and consumption of bulk controlled substances in tonnes, **without** multiplying by the relevant ozone-depleting-potential or global-warming-potential values.

3.2 In order to avoid duplication, quantities contained in manufactured products should not be included in a country's consumption, regardless of whether the end-products are imported or exported.

3.3 It is crucial that data be provided separately for each individual substance listed in the forms. Further, as requested in decision XXIV/14, parties should enter a number in each cell in the data reporting forms that they submit, including zero, where appropriate, rather than leaving any cells blank. This provision does not apply to optional or voluntary data in the reporting forms.

3.4 When calculating production, the Montreal Protocol allows countries to deduct amounts of controlled substances destroyed and amounts used for feedstock and for quarantine and pre-shipment applications. However, when reporting production data, parties **should not deduct** these figures from their data. The Secretariat will make the necessary deductions.

3.5 Parties with approved essential-use exemption should report to the Secretariat on the amounts of controlled substances produced or consumed for those uses using the accounting form approved by decision VIII/9, paragraph 9.

3.6 Parties with approved critical-use exemptions should report to the Secretariat on the amounts of methyl bromide produced or consumed for those uses using the form approved by decision Ex.I/4, paragraph 9 (f) and decision Ex.II/1, paragraph 3.

3.7 Parties might import or export mixtures or blends containing controlled substances, in particular Annex F substances. If this is the case, the parties may choose to report the quantity of the mixture or blend in the designated section on the form. If you choose to report mixtures or blends, please take care to ensure that the quantities reported are those of the mixtures or blends, not their individual constituents. The Secretariat will calculate the quantity of each pure substance from the mixtures or blends and will include the appropriate quantities of those pure substances in the reported data. An illustrative list of mixtures and blends containing controlled substances with their compositions is given in section 11 of these data reporting instructions and guidelines. If the mixture or blend being reported is not included in section 11, please indicate the percentage by weight of each constituent controlled substance of the mixture being reported. For further information about the composition and commercial trade names of chemical products containing controlled substances, visit the "Trade names of chemicals containing ozone-depleting substances and their alternatives" page of the OzonAction website.[1] This worldwide database service is designed to help customs officials and national ozone units control imports and exports of controlled substances and prevent their illegal trade.

[1] http://www.unep.fr/ozonaction/library/tradenames/main.asp

3.8 Parties listed in Appendix II to decision XXVIII/2 that produce or consume controlled substances under the high-ambient-temperature exemption should also report separately production and consumption data to the Secretariat for the subsectors to which the exemption applies (decision XXVIII/2, paragraph 30). Subsector-specific information should be provided by the country using the exemption, not by the producer country. Production under the high-ambient-temperature exemption should only be reported if the production is for use internally by the producing country, not for export.

Section 4: Definitions

4.1 "Consumption" means production plus imports minus exports of controlled substances (Montreal Protocol, Article 1).

4.2 "Controlled substance" means a substance in Annex A, Annex B, Annex C, Annex E or Annex F to the Protocol, whether existing alone or in a mixture. It includes the isomers of any such substance except as specified in the relevant annex, but excludes any controlled substance or mixture (blend) that is in a manufactured product other than a container used for the transportation or storage of that substance (Montreal Protocol, Article 1).

4.3 "Destruction process" is one that, when applied to controlled substances, results in the permanent transformation or decomposition of all or a significant portion of such substances (decisions I/12F, IV/11, V/26 and VII/35).

4.4 "Production" means the amount of controlled substances produced, minus the amount destroyed by technologies approved by the parties and minus the amount entirely used as feedstock in the manufacture of other chemicals. The data forms prescribe reporting of feedstock use and of quantities destroyed separately, and reporting of total production **without** deduction. The Secretariat will make the necessary deduction.

4.5 Amounts recovered, reclaimed or recycled (or reused) are not to be considered as "production" (Montreal Protocol, Article 1), even though they are to be reported (Article 7 of the Protocol).

"Recovery, recycling and reclamation" have been defined by the parties (decision IV/24) as follows:

(a) Recovery: The collection and storage of controlled substances from machinery, equipment, containment vessels, etc., during servicing or prior to disposal;

(b) Recycling: The reuse of a recovered controlled substance following a basic cleaning process such as filtering and drying. For refrigerants, recycling normally involves recharge back into equipment. It often occurs "on-site";

(c) Reclamation: The re-processing and upgrading of a recovered controlled substance through such mechanisms as filtering, drying, distillation and chemical treatment in order to restore the substance to a specified standard of performance. It often involves processing "off-site" at a central facility.

4.6 "Quarantine and pre-shipment applications" have been defined by the parties (decision VII/5) as follows:

(a) "Quarantine applications", with respect to methyl bromide, are treatments to prevent the introduction, establishment and/or spread of quarantine pests (including diseases), or to ensure their official control, where:

(i) Official control is that performed by, or authorized by, a national plant, animal or environmental protection or health authority;

(ii) Quarantine pests are pests of potential importance to the areas endangered thereby and not yet present there, or present but not widely distributed and being officially controlled.

(b) "Pre-shipment applications" are those treatments applied directly preceding and in relation to export, to meet the phytosanitary or sanitary requirements of the importing country or existing phytosanitary or sanitary requirements of the exporting country.

4.7 The Eleventh Meeting of the Parties decided in decision XI/12 that pre-shipment applications are those non-quarantine applications applied within 21 days prior to export to meet the official requirements of the importing country or existing official requirements of the exporting country. Official requirements are those that are performed by, or authorized by, a national plant, animal, environmental, health or stored product authority.

4.8 On transhipment and re-export of substances, the Fourth Meeting of the Parties decided (decision IV/14):

"To clarify Article 7 of the amended Protocol so that it is understood to mean that, in cases of tran(s)shipment of controlled substances through a third country (as opposed to imports and subsequent re-exports), the country of origin of the controlled substances shall be regarded as the exporter and the country of final destination shall be regarded as the importer. In such cases, the responsibility for reporting data shall lie with the country of origin as the exporter and the country of final destination as the importer. Cases of import and re-export should be treated as two separate transactions; the country of origin would report shipment to the country of intermediate destination, which would subsequently report the import from the country of origin and export to the country of final destination, while the country of final destination would report the import."

4.9 With respect to trade in bulk methyl bromide, the Eighth Meeting of the Parties decided (decision VIII/14):

"To clarify decision I/12A of the First Meeting of the Parties as follows: trade and supply of methyl bromide in cylinders or any other container will be regarded as trade in bulk in methyl bromide."

4.10 "Regional economic integration organization" means an organization constituted by sovereign States of a given region that has competence in respect of matters governed by the Vienna Convention for the Protection of the Ozone Layer or its protocols and has been duly authorized, in accordance with its internal procedures, to sign, ratify, accept, approve or accede to the instruments concerned. The only such organization for the purpose of the Montreal Protocol is the European Union.

4.11 The Montreal Protocol stipulates, under paragraph 8 (a) of Article 2, that any parties which are member States of a regional economic integration organization as defined above may agree that they shall jointly fulfil their obligations respecting consumption provided that their total combined calculated level of consumption under Articles 2A to 2J of the Protocol does not exceed the levels required by those articles.

Section 5: Instruction I on data on imports of controlled substances (data form 1)

5.1 Please use data form 1 to report data on imports of substances listed in Annex A (CFCs and halons), Annex B (other fully halogenated CFCs, methyl chloroform and carbon tetrachloride), Annex C (HCFCs, HBFCs and BCM), Annex E (methyl bromide) and Annex F (HFCs).

5.2 All the substances in Annex A, Annex B (Groups II and III) and Annex F are listed in column 2 of data form 1. For Annex B Group I (other fully halogenated CFCs) and Annex C Group I (HCFCs), only substances that have been reported by parties in the past are listed. HBFCs and BCM have already been phased out by all parties, and hence for HBFCs and BCM one blank row has been provided as a formality only. If you are importing controlled substances other than those listed, please use the blank space to report data on those substances, and use additional pages, if necessary.

5.3 If your country imported mixtures (blends) of controlled substances, e.g., R-410A (50% HFC-32; 50% HFC-125), you may choose to report only the quantity of the mixture or blend or the individual constituents of the blend directly. If you choose to report mixtures or blends rather than their individual constituents, please take care to ensure that the quantities reported are those of the mixtures or blends, not their individual constituents. The Secretariat will calculate the quantity of the individual pure controlled substances contained in the mixture or blend and enter the appropriate data under each controlled substance. An illustrative list of mixtures with their compositions is given in section 11 of these data reporting instructions and guidelines. If the mixture being reported is not included in section 11, please indicate the percentage by weight of each constituent controlled substance of the mixture being reported. For further information about the composition and commercial trade names of chemical products containing controlled substances, visit the "Trade names of chemicals containing ozone-depleting substances and their alternatives" page on the OzonAction website.[2] This worldwide database service is designed to help customs officials and national ozone units control imports and exports of controlled substances and prevent their illegal trade.

[2] http://www.unep.fr/ozonaction/library/tradenames/main.asp.

5.4 Please enter the number of tonnes imported in column 3 of data form 1 for each substance imported. If you did not import any of the substances listed, or if you have imported only recovered or reclaimed substances, please enter a zero in column 3, "New", for each substance. If you imported any recovered or reclaimed substances, please enter the data in column 4.

5.5 When calculating a party's consumption, substances used as feedstock for the production of other chemicals are exempted, as such substances are completely transformed in the manufacturing process of the new chemical. In reporting total quantities of new substances imported in column 3, **do not deduct** the quantities imported for feedstock reported in column 5. Similarly, **do not deduct** the quantities imported for exempted essential, critical, high-ambient-temperature or other uses reported in column 6. The Secretariat will make the necessary deductions. In column 7, please indicate, for each type of controlled substance imported for exempted essential, critical, high-ambient-temperature or other uses, the decision of the Meeting of the Parties that approved the use. Should the column space be insufficient, further information can be provided in the "comments" box at the bottom of the form.

5.6 When calculating a party's consumption of methyl bromide, the quantities used for quarantine and pre-shipment applications are excluded. In data form 1, please enter the quantities of methyl bromide imported for quarantine and pre-shipment applications separately at the bottom of the form, and **do not deduct them** from the total quantity imported. The Secretariat will make the necessary deductions.

5.7 Decision XXIV/12, paragraph 1, requested the Secretariat to revise the reporting forms resulting from decision XVII/16 to include an annex indicating the exporting party for the quantities reported as imports, noting that the annex is excluded from the reporting requirements under Article 7 of the Protocol, and that the information in the annex would be provided on a voluntary basis. If a particular controlled substance is imported from more than one country, please indicate the quantity imported from each country separately. Please see the example below.

Annex to data form 1 - Exporting parties for quantities reported as imports **Dataform/2018**

Note: This annex is excluded from the reporting requirements under Article 7 of the Protocol, and the information in the annex is to be provided on a voluntary basis (decision XXIV/12)

(1) Substance	*(2) Exporting party for quantities reported as imports*	*Total quantity imported for all uses*		*(5) Quantity of new substance imported for feedstock uses*	*Quantity of new substance imported for exempted essential, critical, high-ambient-temperature or other uses**	
		(3) New	*(4) Recovered and reclaimed*		*(6) Quantity*	*(7) Decision / type of use* or remark*
HCFC-22	**Country AAA**	**50**				
HCFC-22	**Country BBB**	**75**				
HFC-134a	**Country AAA**	**80**				
HFC-134a	**Country CCC**	**60**				
HFC-134a	**Country DDD**	**30**				
Methyl bromide (CH_3Br)					*Quantity of new methyl bromide imported to be used for quarantine and pre-shipment applications within your country*	

Comments:

* Against each substance imported for exempted essential, critical, high-ambient-temperature or other uses, please specify the Meeting of the Parties decision that approved the use. Should the column space be insufficient, further information can be provided in the "comments" box above.

Section 6: Instruction II on data on exports of controlled substances (data form 2)

6.1 Please use data form 2 to report data on exports, including re-exports, of substances listed in Annex A (CFCs and halons), Annex B (other fully halogenated CFCs, methyl chloroform and carbon tetrachloride), Annex C (HCFCs, HBFCs and BCM), Annex E (methyl bromide) and Annex F (HFCs).

6.2 Data on re-exports of the substances listed above should also be included in this form. Decision IV/14 clarified that cases of import and re-export should be treated as two separate transactions, so that the country of intermediate destination would report both the import from the country of origin and re-export to the country of final destination.

6.3 The first column ("Substance") has been left blank because each party may export different substances. Please add the names and relevant information of only those substances being exported by your country.

6.4 If your country exported mixtures (blends) of controlled substances, e.g., R-410A (50% HFC-32; 50% HFC-125), you may choose to report only the quantity of the mixture or blend, or the individual constituents of the blend directly. If you choose to report mixtures or blends rather than their individual constituents, please take care to ensure that quantities reported are those of the mixtures or blends, not their individual constituents. The Secretariat will calculate the quantity of the individual pure controlled substances contained in the mixture or blend and enter the appropriate data under each controlled substance. An illustrative list of mixtures with their compositions is given in section 11 of these data reporting instructions and guidelines. If the mixture being reported is not included in section 11, please indicate the percentage by weight of each constituent controlled substance of the mixture being reported. For further information about the composition and commercial trade names of chemical products containing controlled substances, visit the "Trade names of chemicals containing ozone-depleting substances and their alternatives" on the OzonAction website.[3] This worldwide database service is designed to help customs officials and national ozone units control imports and exports of controlled substances and prevent illegal trade.

6.5 In decision VII/9, paragraph 4, parties were requested to report on the destination of Annex A and Annex B substances (new, recovered or reclaimed) that are exported. Decision XVII/16, paragraph 4, extended this arrangement to cover the export of all controlled substances contained in the annexes of the Protocol. Please fill in column 2 on the destination of exports, ensuring that if a particular controlled substance is exported to more than one country, the quantity exported to each country is indicated separately. Please see the example below.

[3] http://www.unep.fr/ozonaction/library/tradenames/main.asp.

1. Fill in this form only if your country exported or re-exported CFCs, halons, carbon tetrachloride, methyl chloroform, HCFCs, HBFCs, bromochloromethane, methyl bromide or HFCs

DATA FORM 2

DATA ON EXPORTS*

Dataform/2018

2. Please read instruction II carefully before filling in this form.

in tonnes[1] (not ODP or CO_2-equivalent tonnes)

Annex A, B, C, E and F substances

Party: _____

Period: January – December 20___

(1) Substance	*(2) Country of destination of exports***	*Total quantity exported for all uses*		*(5) Quantity of new substance exported for feedstock****	*Quantity of new substances exported for exempted essential, critical, high-ambient-temperature or other uses*****	
		(3) New	*(4) Recovered and reclaimed*		*(6) Quantity*	*(7) Decision / type of use***** *or remarks*
HCFC-22	**Destination AAA**	**50**				
HCFC-22	**Destination BBB**	**75**				
HFC-134a	**Destination AAA**	**80**				
HFC-134a	**Destination CCC**	**60**				
HFC-134a	**Destination DDD**	**30**				
Methyl bromide (CH_3Br)					*Quantity of new methyl bromide exported to be used for quarantine and pre-shipment applications*	
Comments:						

[1] Tonne = metric ton.

Note: If a non-standard blend not listed in section 11 of the data reporting instructions and guidelines is to be reported, please indicate the percentage by weight of each constituent controlled substance of the mixture being reported in the "remarks" column or in the "comments" box above.

* Includes re-exports. Ref: decisions IV/14 and XVII/16, paragraph 4.

** Applicable to all substances, including those contained in mixtures and blends.

*** Do not deduct from total production in column 3 of data form 3 (data on production).

**** Against each substance exported for exempted essential, critical, high-ambient-temperature or other uses, please specify the Meeting of the Parties decision that approved the use. Should the column space be insufficient, further information can be provided in the "comments" box above.

6.6 If your country is exporting new controlled substances, please provide the quantity in tonnes for the chemical(s) you exported in column 3. If you exported any recovered or reclaimed substances, please enter the data in column 4.

6.7 Under the Montreal Protocol, controlled substances used as feedstock for the production of other chemicals are not included in the calculation of a party's consumption, as such controlled substances are completely transformed in the manufacturing process of new chemicals. When reporting the total quantities of new substances exported in column 3, **do not deduct** the quantities exported to be used as feedstock reported in column 5. Similarly, **do not deduct** the quantities exported for exempted essential, critical, high-ambient-temperature or other uses, reported in column 6. In column 7, please indicate, for each type of controlled substance exported for exempted essential, critical, high-ambient-temperature or other uses, the decision of the Meeting of the Parties that approved the use. Should the column space be insufficient, further information can be provided in the "comments" box at the end of the form.

6.8 When calculating a party's consumption of methyl bromide, quantities used for quarantine and pre-shipment applications are exempted. In data form 2, please enter quantities of methyl bromide exported for quarantine and pre-shipment applications separately, and **do not deduct them** from the quantity exported. The Secretariat will make the necessary deductions.

Section 7: Instruction III on data on production of controlled substances (data form 3)

7.1 Please use data form 3 to report data on production of substances listed in Annex A (CFCs and halons), Annex B (other fully halogenated CFCs, methyl chloroform and carbon tetrachloride), Annex C (HCFCs, HBFCs and BCM), Annex E (methyl bromide) and Annex F (HFCs).

7.2 All the substances in Annex A, Annex B Groups II and III, and Annex F are listed in column 2 of data form 3. For Annex B Group I (other fully halogenated CFCs) and Annex C Group I (HCFCs), only substances that have been reported by parties in the past are listed. HBFCs and BCM have already been phased out by all parties and hence one row has been provided as a formality only. If you are producing controlled substances other than those listed, please use the blank space to report data on those substances, or use additional pages, if necessary.

7.3 In column 3 of data form 3, please give the **total** production of your country **without** making any deductions for feedstock, destruction, export for feedstock uses, or any other use. **Do not deduct** from your total production the quantity of production used for feedstock **within** your country reported in column 4, or the production for exempted essential, critical, high-ambient-temperature or other uses within your country reported in column 5. Similarly, **do not deduct** from your total production the quantity of production for supply to Article 5 parties reported in column 7. Please report exports of controlled substances to be used for feedstock by the importing country in column 5 of data form 2 (data on exports), not in data form 3 (this form). The Secretariat will make the necessary deductions. With regard to production for exempted essential, critical, high-ambient-temperature or other uses, please indicate in column 6, for each type of controlled substance produced for exempted essential, critical, high-ambient-temperature or other uses, the decision of the Meeting of the Parties that approved the use. Should the column space be insufficient, further information can be provided in the "comments" box at the end of the form.

7.4 When calculating a party's consumption, the Montreal Protocol does not include controlled substances used as feedstock for the production of other chemicals, as such controlled substances are completely transformed in the manufacturing process of the new chemical. If your country produced controlled substances for feedstock use within the reporting period, please provide data on the quantity of each controlled substance produced for feedstock purposes in column 4. The Secretariat will make the necessary deductions. By-production that is captured, whether for destruction, feedstock or any other use, shall be reported as production. Amounts converted to other substances shall be reported as production for feedstock uses.

7.5 Producers are allowed to produce additional amounts to meet the basic domestic needs of Article 5 parties. If your country produced controlled substances for this purpose, please enter the amount so produced in column 7 of data form 3.

7.6 When calculating a party's consumption of methyl bromide, quantities produced for quarantine and pre-shipment applications are exempted. Please enter the total quantities of methyl bromide produced for quarantine and pre-shipment applications separately at the bottom of data form 3 and **do not deduct them** from the total quantity produced. The Secretariat will make the necessary deductions.

Section 8: Instruction IV on data on destruction of controlled substances (data form 4)

8.1 Very few countries have the capacity to destroy controlled substances using approved destruction technologies. If your country has destroyed any of the substances listed in Annex A (CFCs and halons), Annex B (other fully halogenated CFCs, methyl chloroform and carbon tetrachloride), Annex C (HCFCs, HBFCs and BCM), Annex E (methyl bromide) and Annex F (HFCs) in the reporting period, please use data form 4.

8.2 The first column ("Substance") has been left blank because each party may destroy different substances. Please list only the names of those substances destroyed in the reporting year.

8.3 Under the Montreal Protocol, the amount of substances destroyed is not included in the calculation of a party's production and consumption if destruction occurred through the use of an approved technology (listed in decision XXIII/12 and any subsequent relevant decisions). If you have destroyed any substance in the reporting year, **do not deduct** the quantity destroyed reported in column 2 of data form 4 from the total production reported in column 3 of data form 3. The Secretariat will make the necessary deductions.

Section 9: Instruction V on data on imports from and exports to non-parties (data form 5)

9.1 Please use data form 5 to report data on imports from and exports to non-parties of substances of Annex A (CFCs and halons), Annex B (other fully halogenated CFCs, methyl chloroform and carbon tetrachloride), Annex C (HCFCs, HBFCs and BCM) and Annex E (methyl bromide).

9.2 The first column ("Substance") has been left blank because each party may import different substances from and/or export different substances to non-parties. Please fill in only the names of those substances that were imported from and/or exported to non-parties.

9.3 For purposes of these data forms, "non-party" means:

- With respect to Annex A substances, all countries that have not ratified the 1987 Montreal Protocol;
- With respect to Annex B substances, all countries that have not ratified the London Amendment;
- With respect to Annex C substances, all countries that have not ratified the Copenhagen Amendment;
- With respect to Annex E substances, all countries that have not ratified the Copenhagen Amendment;

except where the parties have otherwise specified by means of a decision.

9.4 Any export of HFC reported as export to a non-party shall not be treated as export to non-parties for the purpose of calculating the consumption level as specified in paragraph 1 (c) of Article 3 of the Montreal Protocol. Therefore, exports of HFCs to non-parties should not be reported under data form 5 but should be reported under data form 2.

9.5 The status of ratification of the Montreal Protocol and its amendments can be found in a document published by the Secretariat and updated twice a year. That information is also available on the website of the Ozone Secretariat, at: http://ozone.unep.org/.

Section 10: Instruction VI on data on emissions of Annex F Group II substance – HFC-23 (data form 6)

10.1 Very few countries will have manufacturing facilities for Annex C Group I or Annex F substances that generate HFC-23. If your country has such facilities that were operational in the reporting period, please use data form 6 to report emissions of HFC-23 from each facility. If there were no emissions from a manufacturing facility, please include the facility in the data form and enter a zero in the emissions column.

10.2 The amounts of production or by-production captured for use, feedstock, destruction or storage shall be reported in data form 3 on production. The amounts converted to other substances shall be reported as production for feedstock uses in data form 3.

Section 11: Illustrative list of mixtures containing controlled substances[4]

11.1 Zeotropic mixtures

No.	Refrigerant	Composition											
		Component 1		Component 2		Component 3		Component 4		Component 5		Component 6	
1.	R-401A	HCFC-124	34%	HCFC-22	53%	HFC-152a	13%						
2.	R-401B	HCFC-124	28%	HCFC-22	61%	HFC-152a	11%						
3.	R-401C	HCFC-124	52%	HCFC-22	33%	HFC-152a	15%						
4.	R-402A	HC-290	2%	HCFC-22	38%	HFC-125	60%						
5.	R-402B	HC-290	2%	HCFC-22	60%	HFC-125	38%						
6.	R-403A	HC-290	5%	HCFC-22	75%	PFC-218	20%						
7.	R-403B	HC-290	5%	HCFC-22	56%	PFC-218	39%						
8.	R-404A	HFC-125	44%	HFC-134a	4%	HFC-143a	52%						
9.	R-405A	HCFC-142b	6%	HCFC-22	45%	HFC-152a	7%	PFC-C318	43%				
10.	R-406A	HC-600a	4%	HCFC-142b	41%	HCFC-22	55%						
11.	R-407A	HFC-125	40%	HFC-134a	40%	HFC-32	20%						
12.	R-407B	HFC-125	70%	HFC-134a	20%	HFC-32	10%						
13.	R-407C	HFC-125	25%	HFC-134a	52%	HFC-32	23%						
14.	R-407D	HFC-125	15%	HFC-134a	70%	HFC-32	15%						
15.	R-407E	HFC-125	15%	HFC-134a	60%	HFC-32	25%						
16.	R-407F	HFC-125	30%	HFC-134a	40%	HFC-32	30%						
17.	R-407G	HFC-125	2.5%	HFC-134a	95%	HFC-32	2.5%						
18.	R-408A	HCFC-22	47%	HFC-125	7%	HFC-143a	46%						
19.	R-409A	HCFC-124	25%	HCFC-142b	15%	HCFC-22	60%						
20.	R-409B	HCFC-124	25%	HCFC-142b	10%	HCFC-22	65%						
21.	R-410A	HFC-125	50%	HFC-32	50%								
22.	R-410B	HFC-125	55%	HFC-32	45%								
23.	R-411A	HO-1270	1.5%	HCFC-22	87.5%	HFC-152a	11%						
24.	R-411B	HO-1270	3%	HCFC-22	94%	HFC-152a	3%						
25.	R-412A	HCFC-142b	25%	HCFC-22	70%	PFC-218	5%						
26.	R-413A	HC-600a	3%	HFC-134a	88%	PFC-218	9%						
27.	R-414A	HC-600a	4%	HCFC-124	28.5%	HCFC-142b	16.5%	HCFC-22	51%				
28.	R-414B	HC-600a	1.5%	HCFC-124	39%	HCFC-142b	9.5%	HCFC-22	50%				
29.	R-415A	HCFC-22	82%	HFC-152a	18%								
30.	R-415B	HCFC-22	25%	HFC-152a	75%								
31.	R-416A	HC-600	1.5%	HCFC-124	39.5%	HFC-134a	59%						
32.	R-417A	HC-600	3.4%	HFC-125	46.6%	HFC-134a	50%						
33.	R-417B	HC-600	2.7%	HFC-125	79%	HFC-134a	18.3%						
34.	R-417C	HC-600	1.7%	HFC-125	19.5%	HFC-134a	78.8%						
35.	R-418A	HC-290	1.5%	HCFC-22	96%	HFC-152a	2.5%						
36.	R-419A	HCE-170	4%	HFC-125	77%	HFC-134a	19%						
37.	R-419B	HCE-170	3.5%	HFC-125	48.5%	HFC-134a	48%						
38.	R-420A	HCFC-142b	12%	HFC-134a	88%								
39.	R-421A	HFC-125	58%	HFC-134a	42%								
40.	R-421B	HFC-125	85%	HFC-134a	15%								

[4] For more information about trade names for mixtures and pure substances, visit the "Trade names of chemicals containing ozone-depleting substances and their alternatives" page on the UNEP Division of Technology, Industry and Economics (DTIE) OzonAction website, at http://www.unep.fr/ozonaction/library/tradenames/main.asp. This worldwide database service is designed to help customs officials and national ozone units control imports and exports of controlled substances and prevent their illegal trade.

No.	Refrigerant	Composition											
		Component 1		Component 2		Component 3		Component 4		Component 5		Component 6	
41.	R-422A	HC-600a	3.4%	HFC-125	85.1%	HFC-134a	11.5%						
42.	R-422B	HC-600a	3%	HFC-125	55%	HFC-134a	42%						
43.	R-422C	HC-600a	3%	HFC-125	82%	HFC-134a	15%						
44.	R-422D	HC-600a	3.4%	HFC-125	65.1%	HFC-134a	31.5%						
45.	R-422E	HC-600a	2.7%	HFC-125	58%	HFC-134a	39.3%						
46.	R-423A	HFC-134a	52.5%	HFC-227ea	47.5%								
47.	R-424A	HC-600	1%	HC-600a	0.9%	HC-601a	0.6%	HFC-125	50.5%	HFC-134a	47%		
48.	R-425A	HFC-134a	69.5%	HFC-227ea	12%	HFC-32	18.5%						
49.	R-426A	HC-600	1.3%	HC-601a	0.6%	HFC-125	5.1%	HFC-134a	93%				
50.	R-427A	HFC-125	25%	HFC-134a	50%	HFC-143a	10%	HFC-32	15%				
51.	R-428A	HC-290	0.6%	HC-600a	1.9%	HFC-125	77.5%	HFC-143a	20%				
52.	R-429A	HC-600a	30%	HCE-170	60%	HFC-152a	10%						
53.	R-430A	HC-600a	24%	HFC-152a	76%								
54.	R-431A	HC-290	71%	HFC-152a	29%								
55.	R-434A	HC-600a	2.8%	HFC-125	63.2%	HFC-134a	16%	HFC-143a	18%				
56.	R-435A	HCE-170	80%	HFC-152a	20%								
57.	R-437A	HC-600	1.4%	HC-601	0.6%	HFC-125	19.5%	HFC-134a	78.5%				
58.	R-438A	HC-600	1.7%	HC-601a	0.6%	HFC-125	45%	HFC-134a	44.2%	HFC-32	8.5%		
59.	R-439A	HC-600a	3%	HFC-125	47%	HFC-32	50%						
60.	R-440A	HC-290	0.6%	HFC-134a	1.6%	HFC-152a	97.8%						
61.	R-442A	HFC-125	31%	HFC-134a	30%	HFC-152a	3%	HFC-227ea	5%	HFC-32	31%		
62.	R-444A	HFC-152a	5%	HFC-32	12%	HFO-1234ze (E)	83%						
63.	R-444B	HFC-152a	10%	HFC-32	41.5%	HFO-1234ze (E)	48.5%						
64.	R-445A	HFC-134a	9%	R-744	6%	HFO-1234ze (E)	85%						
65.	R-446A	HC-600	3%	HFC-32	68%	HFO-1234ze (E)	29%						
66.	R-447A	HFC-125	3.5%	HFC-32	68%	HFO-1234ze (E)	28.5%						
67.	R-447B	HFC-125	8%	HFC-32	68%	HFO-1234ze (E)	24%						
68.	R-448A	HFC-125	26%	HFC-134a	21%	HFO-1234ze (E)	7%	HFO-1234yf	20%	HFC-32	26%		
69.	R-449A	HFC-125	24.7%	HFC-134a	25.7%	HFC-32	24.3%	HFO-1234yf	25.3%				
70.	R-449B	HFC-125	24.3%	HFC-134a	27.3%	HFC-32	25.2%	HFO-1234yf	23.2%				
71.	R-449C	HFC-125	20%	HFC-134a	29%	HFC-32	20%	HFO-1234yf	31%				
72.	R-450A	HFC-134a	42%	HFO-1234ze (E)	58%								
73.	R-451A	HFC-134a	10.2%	HFO-1234yf	89.8%								
74.	R-451B	HFC-134a	11.2%	HFO-1234yf	88.8%								
75.	R-452A	HFC-125	59%	HFC-32	11%	HFO-1234yf	30%						
76.	R-452B	HFC-125	7%	HFC-32	67%	HFO-1234yf	26%						
77.	R-452C	HFC-125	61%	HFC-32	12.5%	HFO-1234yf	26.5%						
78.	R-453A	HC-600	0.6%	HC-601a	0.6%	HFC-125	20%	HFC-134a	53.8%	HFC-227ea	5%	HFC-32	20%
79.	R-454A	HFC-32	35%	HFO-1234yf	65%								

No.	Refrigerant	Composition											
		Component 1		Component 2		Component 3		Component 4		Component 5		Component 6	
80.	R-454B	HFC-32	68.9%	HFO-1234yf	31.1%								
81.	R-454C	HFC-32	21.5%	HFO-1234yf	78.5%								
82.	R-455A	HFC-32	21.5%	HFO-1234yf	75.5%	R-744	3%						
83.	R-456A	HFC-134a	45%	HFC-32	6%	HFO-1234ze (E)	49%						
84.	R-457A	HFC-152a	12%	HFC-32	18%	HFO-1234yf	70%						
85.	R-458A	HFC-125	4%	HFC-134a	61.4%	HFC-227ea	13.5%	HFC-236fa	0.6%	HFC-32	20.5%		
86.	R-459A	HFC-32	68%	HFO-1234yf	26%	HFO-1234ze (E)	6%						
87.	R-459B	HFC-32	21%	HFO-1234yf	69%	HFO-1234ze (E)	10%						
88.	R-460A	HFC-125	52%	HFC-134a	14%	HFO-1234ze (E)	22%	HFC-32	12%				
89.	R-460B	HFC-125	25%	HFC-134a	20%	HFO-1234ze (E)	27%	HFC-32	28%				

11.2 Azeotropic mixtures

No.	Refrigerant number (trade name) of mixture	Composition			
		Component 1		Component 2	
1.	R-500	CFC-12	73.8%	HFC-152a	26.2%
2.	R-501	CFC-12	25%	HCFC-22	75%
3.	R-502	CFC-115	51.2%	HCFC-22	48.8%
4.	R-503	CFC-13	59.9%	HFC-23	40.1%
5.	R-504	CFC-115	51.8%	HFC-32	48.2%
6.	R-505	CFC-12	78%	HCFC-31	22%
7.	R-506	CFC-114	45%	HCFC-31	55%
8.	R-507A (AZ-50)	HFC-125	50%	HFC-143a	50%
9.	R-508A	HFC-23	39%	PFC-116	61%
10.	R-508B	HFC-23	46%	PFC-116	54%
11.	R-509 (TP5R2)	HCFC-22	46%	PFC-218	54%
12.	R-509A	HCFC-22	44%	PFC-218	56%
13.	R-512A	HFC-134a	5%	HFC-152a	95%
14.	R-513A (XP10/DR-11)	HFC-134a	44%	HFO-1234yf	56%
15.	R-513B	HFC-134a	41.5%	HFO-1234yf	58.5%
16.	R-515A	HFC-227ea	12%	HFO-1234ze (E)	88%

11.3 Other mixtures

No.	Trade name of mixture	Composition							
		Component 1		Component 2		Component 3		Component 4	
1.	FX 20	HFC-125	45%	HCFC-22	55%				
2.	FX 55	HCF-C22	60%	HCFC-142b	40%				
3.	D 136	HCFC-22	50%	HCFC-124	47%	HC-600a	3%		
4.	Daikin Blend	HFC-23	2%	HFC-32	28%	HCFC-124	70%		
5.	FRIGC	HCFC-124	39%	HCFC-134a	59%	HC-600a	2%		
6.	Free Zone	HCFC-142b	19%	HFC-134a	79%	Lubricant	2%		
7.	GHG-HP	HCFC-22	65%	HCFC-142b	31%	HC-600a	4%		
8.	GHG-X5	HCFC-22	41%	HCFC-142b	15%	HFC-227ea	40%	HC-600a	4%
9.	NARM-502	HCFC-22	90%	HFC-152a	5%	HFC-23	5%		
10.	NASF-S-III[5]	HCFC-22	82%	HCFC-123	4.75 %	HCFC-124	9.5%	HC-600a	3.75%

11.4 Methyl bromide mixtures

No.	Trade name of mixture	Composition			
		Component 1		Component 2	
1.	Methyl bromide with chloropicrin	Methyl bromide	67%	Chloropicrin	33%
2.	Methyl bromide with chloropicrin	Methyl bromide	98%	Chloropicrin	2%

[5] A halon alternative

Appendix II

Reporting provisions and clarifications associated with reporting of information other than Article 7 reporting

Reporting provisions and related decisions for reporting of information other than Article 7 reporting

Basis for reporting	*Information to be provided*
Transfer or addition of production or consumption	***(reported as and when it occurs)***
Article 2, paragraphs 5, 5 bis, 6, 7	Transfer or addition of production or consumption
Trade with non-parties (Article 4)	
Decision IV/17 A, paragraph 1	Information on the implementation of Article 4 of the Protocol, control of trade with non-parties
Licensing information	***(reporting periodicity specified below***
(a) Article 4B – Licensing	The establishment and operation of its licensing system *(reported once)*
(b) Decision IX/8, paragraph 2	Focal points for licensing systems for trade in controlled substances *(reported once, updated as required)*
(c) Decision XIV/7, paragraph 7	Information reported by the parties on illegal trade in controlled substances *(reported when cases occur)*
(d) Decision XXVII/8	Parties wishing to avoid the unwanted import of products and equipment containing or relying on hydrochlorofluorocarbons *(notification sent once)*
Research, development, public awareness and exchange of information	***(reported every two years)***
Article 9	Summary of activities
Essential-use exemptions other than laboratory and analytical uses[6]	***(reported the year following an exemption)***
Decision VIII/9, paragraph 9	Report on quantities and uses of controlled substances produced and consumed for essential uses (reporting accounting framework)
Essential-use exemptions: laboratory and analytical uses	***(reported annually)***
Decision VI/9, paragraph 4, of annex II to the report of the Sixth Meeting of the Parties	Each controlled substance produced for laboratory and analytical uses
Exemption for high-ambient-temperature parties	***(reported the year following an exemption)***
Decision XXVIII/2, paragraph 30	Report separately production and consumption data for the subsectors to which the exemption applies
Critical-use exemptions for methyl bromide information	***(reported once)***
(a) Decision Ex.I/3, paragraph 5	Parties that have a methyl bromide critical-use exemption to report on the implementation of the requirement to ensure that the criteria in paragraph 1 of decision IX/6 are applied when licensing, permitting or authorizing the use of methyl bromide and that such procedures take into account available stocks

[6] Decisions relating to essential-use exemptions for CFCs for metered-dose inhalers for the treatment of asthma and chronic obstructive pulmonary diseases are no longer included here, since such exemptions have been phased out.

Basis for reporting	*Information to be provided*
(b) Decision Ex.I/4, paragraph 2	Parties seeking methyl bromide critical-use exemptions and parties that have ceased methyl bromide consumption to submit information on the alternatives available, listed according to their pre-harvest or post-harvest uses and the possible date of registration, if required, for each alternative; and on the alternatives that the parties can disclose to be under development, listed according to their pre-harvest or post-harvest uses and the likely date of registration, if required and known, for those alternatives
(c) Decision Ex.I/4, paragraphs 3 and 6	Parties seeking methyl bromide critical-use exemptions to submit national methyl bromide phase-out strategy and describe methodology used to determine economic feasibility in the event that economic feasibility is used as a criterion to justify the critical use
(d) Decision Ex.I/4, paragraph 9 (f), and decision Ex.II/1, paragraph 3	Report on quantities and uses of methyl bromide produced, imported and exported for critical uses in accounting framework
Process agent uses	***(reported annually)***
Decisions X/14, XV/7, XVII/6 and XXI/3	Use of controlled substances as process agents, make-up amounts, resulting emissions, emission containment technologies employed and opportunities for emission reduction. Report on quantities of controlled substances produced or imported for process agent applications
Requests for changes in reported baseline data	***(reported once)***
(a) Decision XIII/15, paragraph 5	Requests for changes in reported baseline data for the base years to be presented to the Implementation Committee, which will in turn work with the Ozone Secretariat and the Executive Committee to confirm the justification for the changes and present them to the Meeting of the Parties for approval
(b) Decision XV/19, paragraph 2	Methodology for submission of requests for revision of baseline data: the information and documentation to be submitted
Other information	***(reporting periodicity specified below)***
(a) Decision V/15	Information relevant to international halon bank management *(reported once)*
(b) Decision V/25 and VI/14A	Parties supplying controlled substances to parties operating under paragraph 1 of Article 5 (Article 5 party) to provide annually summary of requests from importing parties *(reported annually)*
(c) Decision VI/19, paragraph 4	List of reclamation facilities and their capacities *(reported annually)*
(d) Decisions X/8 and IX/24	New ozone-depleting substances reported by the parties *(reported when new substances emerge)*
(e) Decision XX/7, paragraph 5	Strategies on environmentally sound management of banks of ozone-depleting substances *(reported once, updated as required)*

1. The control measures under Articles 2A-2E, 2G and 2I include a provision for parties to decide to permit levels of production or consumption that are necessary to satisfy uses agreed by them to be essential. Decision IV/25 on essential uses states that a use of a controlled substance should qualify as "essential" only if:

(a) It is necessary for the health, safety or is critical for the functioning of society (encompassing cultural and intellectual aspects); and

(b) There are no available technically and economically feasible alternatives or substitutes that are acceptable from the standpoint of environment and health.

2. The conditions applied to exemption for laboratory and analytical uses, which fall under essential uses, are provided in annex II to the report of the Sixth Meeting of the Parties.

3. The control measures under Article 2H include a provision for parties to decide to permit levels of production or consumption that are necessary to satisfy uses agreed by them to be critical uses. In decision IX/6 on critical uses, the parties agreed to apply the following criteria and procedure in assessing a critical methyl bromide use for the purposes of control measures in Article 2 of the Protocol:

(a) That a use of methyl bromide should qualify as "critical" only if the nominating party determines that:

(i) The specific use is critical because the lack of availability of methyl bromide for that use would result in a significant market disruption; and

(ii) There are no technically and economically feasible alternatives or substitutes available to the user that are acceptable from the standpoint of environment and health and are suitable to the crops and circumstances of the nomination;

(b) That production and consumption, if any, of methyl bromide for critical uses should be permitted only if:

(i) All technically and economically feasible steps have been taken to minimize the critical use and any associated emission of methyl bromide;

(ii) Methyl bromide is not available in sufficient quantity and quality from existing stocks of banked or recycled methyl bromide, also bearing in mind the developing countries' need for methyl bromide;

(iii) It is demonstrated that an appropriate effort is being made to evaluate, commercialize and secure national regulatory approval of alternatives and substitutes, taking into consideration the circumstances of the particular nomination and the special needs of Article 5 parties, including lack of financial and expert resources, institutional capacity, and information. Parties not operating under paragraph 1 of Article 5 (non-Article 5 parties) must demonstrate that research programmes are in place to develop and deploy alternatives and substitutes. Article 5 parties must demonstrate that feasible alternatives shall be adopted as soon as they are confirmed as suitable to the party's specific conditions and/or that they have applied to the Multilateral Fund or other sources for assistance in identifying, evaluating, adapting and demonstrating such options;

4. "Process agents" should be understood to mean the use of controlled substances for the applications listed in table A of decision X/14, as amended by various decisions. Amounts produced or imported for use as process agents in plants and installations in operation before 1 January 1999 should not be taken into account in the calculation of production and consumption from 1 January 2002 onwards, provided that:

(a) In the case of non-Article 5 parties, the emissions of controlled substances from these processes have been reduced to insignificant levels as defined in table B of decision X/14, as amended by various decisions;

(b) In the case of Article 5 parties, the emissions of controlled substances from process-agent use have been reduced to levels agreed by the Executive Committee to be reasonably achievable in a cost-effective manner without undue abandonment of infrastructure.

Appendix III

Reporting on consumption and production under the exemption for high-ambient-temperature parties

Section 1: Instruction VII on data on consumption (imports) under the exemption for high-ambient-temperature parties (data form 7)

1.1 If your country formally notified the Secretariat, as specified under paragraph 29 of decision XXVIII/2, of its intention to use the exemption for high-ambient-temperature parties and is listed in appendix II of decision XXVIII/2, please use data form 7 to report quantities of new HFCs imported for use in approved subsectors as listed in annex I to the decision. Those imports must be for use within your country and not for export. In case other subsectors are approved after the assessments under paragraphs 32 and 33 of decision XXVIII/2, please use the additional columns in the data form to specify the approved subsectors and the amounts imported for use in those subsectors. Only bulk gases for servicing of equipment in the exempted subsectors should be reported here, not gases imported inside pre-charged equipment.

Section 2: Instruction VIII on data on production under the exemption for high-ambient-temperature parties (data form 8)

2.1 Very few countries listed in Appendix II of decision XXVIII/2 have production facilities for Annex F substances (HFCs). If your country formally notified the Secretariat, as specified under paragraph 29 of decision XXVIII/2, of its intention to use the exemption for high-ambient-temperature parties and is listed in Appendix II of decision XXVIII/2, please use data form 8 to report quantities of HFC produced for use in approved subsectors as listed in annex I to the decision. That production must be for use within your country and not for export. In case other subsectors are approved after the assessments under paragraphs 32 and 33 of decision XXVIII/2, please use the additional columns in the data form to specify the approved subsectors and the amounts produced for use in those subsectors.

Data form 7 on consumption (imports) under the exemption for high-ambient-temperature parties

1. Fill in this form only if your country is listed in Appendix II to decision XXVIII/2, has formally notified the Secretariat of its intention to use the high-ambient-temperature exemption, and imported HFCs for its own use in the subsectors contained in Appendix I to decision XXVIII/2.

Party _____

DATA FORM 7 — **HAT_Dataform/2018**

DATA ON IMPORTS OF ANNEX F SUBSTANCES FOR EXEMPTED SUBSECTORS

in tonnes[1] (not ODP or CO_2-equivalent tonnes)

Period: January - December 20___

(1) *Annex group*	*(2)* *Substance*	*Quantity of new substances imported for approved subsectors to which the high-ambient-temperature exemption applies (columns to be added as required for other subsectors that may be approved after the assessments under paragraphs 32 and 33 of decision XXVIII/2)**				
		(3) *New imports for use in multi-split air conditioners*	*(4)* *New imports for use in split ducted air conditioners*	*(5)* *New imports for use in ducted commercial packaged (self-contained) air conditioners*	*(6)* *New imports for use in subsector***	*(7)* *New imports for use in subsector***
F-Group I	HFC-32 (CH_2F_2)					
	HFC-41 (CH_3F)					
	HFC-125 (CHF_2CF_3)					
	HFC-134 (CHF_2CHF_2)					
	HFC-134a (CH_2FCF_3)					
	HFC-143 (CH_2FCHF_2)					
	HFC-143a (CH_3CF_3)					
	HFC-152 (CH_2FCH_2F)					
	HFC-152a (CH_3CHF_2)					
	HFC-227ea (CF_3CHFCF_3)					
	HFC-236cb ($CH_2FCF_2CF_3$)					
	HFC-236ea (CHF_2CHFCF_3)					
	HFC-236fa ($CF_3CH_2CF_3$)					
	HFC-245ca ($CH_2FCF_2CHF_2$)					
	HFC-245fa ($CHF_2CH_2CF_3$)					
	HFC-365mfc ($CF_3CH_2CF_2CH_3$)					
	HFC-43-10mee ($CF_3CHFCHFCF_2CF_3$)					
F-Group II	HFC-23 (CHF_3)					
Mixtures and blends containing controlled substance(s) — applicable to all substances, not just HFCs (add additional rows or pages as required for blends not listed below)						
R-404A (HFC-125 = 44%, HFC-134a = 4%, HFC-143a = 52%)						
R-407A (HFC-32 = 20%, HFC-125 = 40%, HFC-143a = 40%)						
R-407C (HFC-32 = 23%, HFC-125 = 25%, HFC-143a = 52%)						
R-410A (HFC-32 = 50%, HFC-125 = 50%)						

(1) *Annex group*	(2) *Substance*	*Quantity of new substances imported for approved subsectors to which the high-ambient-temperature exemption applies (columns to be added as required for other subsectors that may be approved after the assessments under paragraphs 32 and 33 of decision XXVIII/2)*•				
		(3) *New imports for use in multi-split air conditioners*	(4) *New imports for use in split ducted air conditioners*	(5) *New imports for use in ducted commercial packaged (self-contained) air conditioners*	(6) *New imports for use in subsector*••	(7) *New imports for use in subsector*••
R-507A (HFC-125 = 50%, HFC-143a = 50%)						
R-508B (HFC-23 = 46%, PFC-116 = 54%)						
Comments						

[1] Tonne = Metric ton.

Note: If a non-standard blend not listed in section 11 of the data reporting instructions and guidelines is to be reported, please indicate the percentage by weight of each constituent controlled substance of the mixture being reported in the "comments" box above.

• Only bulk gases for servicing of exempted equipment should be reported here, not gases imported inside pre-charged equipment.

•• For each substance imported for use in subsectors that may be approved after the assessments under paragraphs 32 and 33 of decision XXVIII/2, please specify the approved subsector. Should the column space be insufficient, further information can be provided in the "comments" box above.

Data form 8 on production under the exemption for high-ambient-temperature parties

1. Fill in this form only if your country is listed in appendix II to decision XXVIII/2, has formally notified the Secretariat of its intention to use the high-ambient-temperature exemption, and produced HFCs for its own use in the subsectors contained in appendix I to decision XXVIII/2.

Party: _____

DATA FORM 8 **HAT_Dataform/2018**

DATA ON PRODUCTION OF ANNEX F SUBSTANCES FOR EXEMPTED SUBSECTORS

in tonnes[1] (not ODP or CO_2-equivalent tonnes)

Period: January - December 20____

(1) *Annex group*	(2) *Substance*	Quantity of new substances *produced for approved subsectors to which the high-ambient-temperature exemption applies (production should be for use within the producing country) (columns to be added as required for other sub-sectors that may be approved after the assessments under paragraphs 32 and 33 of decision XXVIII/2)**				
		(3) *New production for use in multi-split air conditioners*	(4) *New production for use in split ducted air conditioners*	(5) *New production for use in ducted commercial packaged (self-contained) air conditioners*	(6) *New production for use in subsector**	(7) *New production for use in subsector**
F-Group I	HFC-32 (CH_2F_2)					
	HFC-41 (CH_3F)					
	HFC-125 (CHF_2CF_3)					
	HFC-134 (CHF_2CHF_2)					
	HFC-134a (CH_2FCF_3)					
	HFC-143 (CH_2FCHF_2)					
	HFC-143a (CH_3CF_3)					
	HFC-152 (CH_2FCH_2F)					
	HFC-152a (CH_3CHF_2)					
	HFC-227ea (CF_3CHFCF_3)					
	HFC-236cb ($CH_2FCF_2CF_3$)					
	HFC-236ea (CHF_2CHFCF_3)					
	HFC-236fa ($CF_3CH_2CF_3$)					
	HFC-245ca ($CH_2FCF_2CHF_2$)					
	HFC-245fa ($CHF_2CH_2CF_3$)					
	HFC-365mfc ($CF_3CH_2CF_2CH_3$)					
	HFC-43-10mee ($CF_3CHFCHFCF_2CF_3$)					
F-Group II	HFC-23 (CHF_3)					

Comments:

[1] Tonne = Metric ton.

* For each substance produced for use in subsectors that may be approved after the assessments under paragraphs 32 and 33 of decision XXVIII/2, please specify the approved subsector. Should the column space be insufficient, further information can be provided in the "comments" box above.

UNITED
NATIONS

EP

UNEP/OzL.Pro.WG.1/40/4

Distr.: General
4 May 2018

Original: English

United Nations
Environment
Programme

Open-ended Working Group of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer
Fortieth meeting
Vienna, 11–14 July 2018
Item 7 (b) of the provisional agenda*

Requirements for hydrochlorofluorocarbons for the period from 2020 to 2030 for parties not operating under paragraph 1 of Article 5 of the Protocol (decision XXIX/9): proposed adjustments to the Montreal Protocol

Proposed adjustment to the Montreal Protocol submitted by the United States of America

Note by the Secretariat

Pursuant to paragraph 9 of Article 2 of the Montreal Protocol on Substances that Deplete the Ozone Layer, the Secretariat is circulating in annexes I and II to the present note explanatory information and a proposal submitted by the United States of America to adjust the Montreal Protocol. The text of the proposal is presented as received by the Secretariat, without formal editing.

* UNEP/OzL.Pro.WG.1/40/1/Rev.1.

K1801028 170518

Annex I

Explanatory information on the proposal submitted by the United States of America to adjust the HCFC phase-out schedule

The United States proposes to adjust the 0.5% servicing tail for hydrochlorofluorocarbons (HCFCs) from January 1, 2020 to January 1, 2030 to additionally cover the servicing of fire suppression equipment existing before 2020. The proposal would amend paragraphs 6(a) and (b) of Article 2F to expand the scope of the servicing tail, which currently covers only existing refrigeration and air-conditioning equipment, to also include existing fire suppression equipment. This proposal would not increase the amount of the servicing tail. It would provide flexibility for production and consumption of HCFCs to be used to service remaining HCFC-based fire suppression equipment in place prior to 2020 helping to prevent the premature retirement of existing equipment.

We note that the findings of the March 2018 report by the Technology and Economic Assessment Panel acknowledge the continued need for HCFCs for fire suppression sector uses from 2020 to 2030. Consistent with these findings, we foresee some continuing uses in the U.S. fire suppression sector for HCFCs.

We welcome discussion on the elements of this proposed adjustment.

Annex II

Text of the U.S. proposal to adjust the HCFC phase-out schedule

Article 2F, paragraph 6(a)

In paragraph 6 (a) of Article 2F of the Protocol, for the words:

"refrigeration and air-conditioning"

there shall be substituted:

"fire suppression, refrigeration and air-conditioning"

Article 2F, paragraph 6(b)

In paragraph 6 (b) of Article 2F of the Protocol, for the words:

"refrigeration and air-conditioning"

there shall be substituted:

"fire suppression, refrigeration and air-conditioning"

UNITED
NATIONS

EP

UNEP/OzL.Pro.WG.1/40/5

Distr.: General
4 May 2018

Original: English

United Nations
Environment
Programme

Open-ended Working Group of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer
Fortieth meeting
Vienna, 11–14 July 2018
Item 7 (b) of the provisional agenda*

Requirements for hydrochlorofluorocarbons for the period from 2020 to 2030 for parties not operating under paragraph 1 of Article 5 of the Protocol (decision XXIX/9): proposed adjustments to the Montreal Protocol

Proposed adjustment to the Montreal Protocol submitted by Australia and Canada

Note by the Secretariat

Pursuant to paragraph 9 of Article 2 of the Montreal Protocol on Substances that Deplete the Ozone Layer, the Secretariat is circulating in annexes I and II to the present note explanatory information and a proposal submitted by Australia and Canada to adjust the Montreal Protocol. The text of the proposal is presented as received by the Secretariat, without formal editing.

* UNEP/OzL.Pro.WG.1/40/1/Rev.1.

K1801019 170518

Annex I

Explanatory information

The purpose of the Australian and Canadian proposal is to:

- Permit essential use exemptions of HCFCs to be considered and authorized by Parties as exist for other ozone depleting substances, and particularly to ensure that HCFCs continue to be available for laboratory and analytical uses after 2020; and
- Extend the use of the existing 0.5% servicing tail from 2020 to 2030 to service fire protection equipment installed before 2020 in addition to refrigeration and air-conditioning.

The proposal addresses concerns raised in discussions of the Meeting of Parties since 2015 about current restrictions on the use of HCFCs after 2020. We welcome discussion on the key elements of the adjustment. The proposal has two elements:

A change to paragraph 6 (Article 2F) to permit possible HCFC essential uses by Parties.

A change to paragraphs 6(a) and (b) (Article 2F) to add fire protection equipment to the equipment permitted to be serviced by HCFCs after 2020.

The proposed adjustment is consistent with the TEAP's March 2018 report which advised HCFCs could be needed to service existing fire protection equipment and that small quantities of HCFC would be needed for laboratory and analytical uses.

Brief discussion of these elements

Paragraph 6 of Article 2F

This proposal will allow consideration of HCFC-based essential uses by the Parties.

The proposed language mirrors exactly the language related for essential uses of CFCs (Article 2A, paragraph 4), halons (Article 2B, paragraph 2), other CFCs (Article 2C, paragraph 3), carbon tetrachloride (Article 2D, paragraph 2), methyl chloroform (Article 2E, paragraph 3), hydrobromofluorocarbons (Article 2G), and bromochloromethane (Article 2I).

This language would allow the Parties to consider the possibility of HCFC-based essential uses. Any decision to permit any essential uses or decisions on how to administer any essential uses would still be taken by the Parties on a case-by-case basis.

We foresee that laboratory and analytical uses for HCFCs would be required for some time to ensure the continued availability of HCFCs for atmospheric and laboratory measuring equipment and procedures. However, unless this adjustment is made, a decision to permit laboratory and analytical uses of HCFCs cannot be taken.

The TEAP, in its March 2018 report, has confirmed the need for Laboratory and Analytical uses of HCFC for reference standards and calibration purposes.

Paragraphs 6(a) and 6(b) of Article 2F

This proposal will continue to restrict the 0.5% HCFC tail to servicing of equipment installed before 2020, but permit fire protection equipment to be serviced, along with refrigeration and air conditioning equipment.

The proposed addition will permit HCFCs to be produced and used to service existing refrigeration and air conditioning and fire protection equipment.

While we anticipate that most HCFCs would be used to service existing refrigeration and air conditioning equipment, we foresee some small requirements in the fire protection sector.

The proposal does not increase the amount of the servicing tail, nor does it permit HCFC for new equipment or non-servicing purposes. It merely provides flexibility for HCFCs to be used to service remaining HCFC-based refrigeration and air conditioning and fire protection equipment in place until the end of its useful life.

The TEAP, in its March 2018 report, has confirmed the need for servicing requirements in the fire protection sector.

Annex II

Text of adjustment proposal

Article 2F, paragraph 6

(1) The following sentence shall be added to the end of paragraph 6 (after the words "does not exceed zero." and before the word "However,"),

This paragraph will apply save to the extent that the Parties decide to permit the level of production or consumption that is necessary to satisfy uses agreed by them to be essential.

Article 2F, paragraph 6(a)

(2) The following words shall be added after the words "refrigeration and air conditioning":

and fire protection

Article 2F, paragraph 6(b)

(3) The following words shall be added after the words "refrigeration and air conditioning":

and fire protection

UNEP/
Ozl.Pro.WG.1/
40/6

Readex
Fiche

UNITED
NATIONS

EP

UNEP/OzL.Pro.WG.1/40/6

Distr.: General
11 July 2018

Original: English

United Nations
Environment
Programme

Open-ended Working Group of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer
Fortieth meeting
Vienna, 11–14 July 2018
Item 6 (b) of the provisional agenda*

Summary of the workshop on energy efficiency opportunities while phasing down hydrofluorocarbons

Note by the Secretariat

1. The annex to the present note contains a summary of the workshop on energy efficiency opportunities while phasing down hydrofluorocarbons that was held in Vienna on 9 and 10 July 2018.

2. The summary, which is set out in the annex to the present note, is reproduced as received by the Secretariat, without formal editing.

* UNEP/OzL.Pro.WG.1/40/1/Rev.1.

K1801674 110718

Annex

Summary of the workshop on energy efficiency opportunities while phasing down hydrofluorocarbons (Vienna, 9 and 10 July 2018)

Introduction

1. Under the Kigali Amendment to the Montreal Protocol, parties recognized the importance of maintaining and/or enhancing energy efficiency while transitioning away from high-global-warming-potential (GWP) hydrofluorocarbons (HFCs) to low-GWP alternatives in the refrigeration, air-conditioning and heat-pump sectors. Parties also recognized that maintaining and/or enhancing energy efficiency could have significant climate benefits.

2. A one-and-a-half-day workshop on energy efficiency opportunities while phasing down HFCs was convened in accordance with decision XXIX/10 (para. 4) taken by the parties to the Montreal Protocol on Substances that Deplete the Ozone Layer at their twenty-ninth Meeting, held jointly with the eleventh meeting of the Conference of the Parties to the Vienna Convention for the Protection of the Ozone Layer, in Montreal (20–24 November 2017).

3. The objectives of the workshop were to provide an opportunity for parties and other stakeholders to discuss in depth:

(a) The types of technical opportunities that can be adopted to improve the energy efficiency of both new and existing refrigeration, air-conditioning and heat-pump (RACHP) equipment, as well as improvements to building design

(b) The barriers to these opportunities and the ways in which barriers can be overcome through appropriate policy measures and investments

(c) The connections between Montreal Protocol activities to phase down HFCs and other activities that are addressing energy efficiency issues in the RACHP sectors.

4. The workshop involved 34 speakers, supported by six session facilitators and seven rapporteurs. The more than 450 participants came from governments, industry and industry associations, international and non-governmental organizations, academic institutions, consulting firms and other organizations. Sessions included presentations and panel discussions, with opportunities for all participants to contribute through questions and statements addressed to the speakers, including through a smartphone application that allowed questions to be submitted electronically.

5. The three main sections of the workshop addressed:

(a) The overall context of energy efficiency in the refrigeration, air-conditioning and heat-pump sectors

(b) Technical opportunities for improving RACHP energy efficiency

(c) Investment, financial and policy measures that encourage improved cooling efficiency, and the potential relationship between energy efficiency policies and the Kigali Amendment.

6. Three briefing notes distributed by the Ozone Secretariat in advance of the workshop helped participants better understand energy efficiency issues.

7. The present document summarizes the key issues raised in each session of the workshop, including those raised in presentations and in subsequent question-and-answer sessions with participants.

A. Background to energy efficiency in the refrigeration, air-conditioning and heat-pump sectors

8. The objective of the session was to set the scene by examining overarching issues and challenges to improving energy efficiency in the RACHP sectors.

9. RACHP use in Article 5 countries is expected to more than double by 2030 and more than triple by 2050. Currently, refrigerant emissions and energy use in the RACHP sectors both contribute to global warming, with energy use accounting for more than 80 per cent of the sectors' combined carbon footprint. As a consequence, various interventions will be required to avoid a very large increase in energy demand from the use of RACHP equipment. According to the International Energy

Agency, almost half of the near-term reductions in emissions required to meet the goals of the Paris Agreement can be achieved by adopting cost-effective energy efficiency measures, including in the RACHP sector. Global energy efficiency improved by 13 per cent overall between 2000 and 2016, but progress has since slowed because of a reduction in the number of energy efficiency policies enacted and a decrease in energy prices.

10. There is significant technical potential to reduce RACHP energy consumption by reducing cooling loads; minimizing the temperature lift; accounting for variable operating conditions; selecting the most efficient refrigeration cycle, refrigerant and components; designing effective control systems; monitoring operating performance; and correcting faults.

11. Despite the excellent potential that exists, uptake of energy efficiency measures is slow owing to a lack of understanding of how to improve energy efficiency, poor design and selection of equipment, a lack of monitoring and analysis of performance, and narrow financial analysis that does not value the multiple benefits of energy efficiency improvements.

12. As an example of the benefits and challenges of improving energy efficiency, several presentations highlighted the fact that requiring all new air-conditioning units to be very efficient would cut growth in demand for cooling energy by half. If combined with efficient building design, this would completely eliminate growth in the use of energy for space cooling. The average energy efficiency of air conditioners currently on the market is less than half that of efficient products available in most markets, and one third that of the best available technology. Consumers tend to buy the least expensive units even though the extra capital cost of a more energy-efficient unit is usually recovered within one to three years from the resulting energy savings.

13. The introduction of high-energy-efficiency technologies often creates an initial "price hump" that can make them less competitive than conventional technologies. The size and duration of this hump can be reduced through appropriate policies and financial interventions, such as minimum energy performance standards (MEPS), grants and low-cost loans, and bulk procurement programmes. Presenters and some participants advocated for an integrated approach that links efficiency with the refrigerant transition.

14. Given its many benefits, energy efficiency is best seen as an enabler of sustainable development; RACHP goes far beyond comfort and has positive impacts on food safety, health and many other elements of the Sustainable Development Goals.

B. The technical potential for improving energy efficiency in the refrigeration, air-conditioning and heat-pump sectors

15. Two workshop sessions aimed to outline the technical potential for improving the energy efficiency of new RACHP products (session 2) and existing RACHP products (session 3).

1. New products

16. Presentations highlighted the wide range of new RACHP products that have large energy efficiency improvements compared to older designs; energy savings of well over 50 per cent were illustrated through a number of presentations. Some examples described were:

(a) Reductions in cooling demand through such measures as ventilation cooling, improved building design, doors on retail display cases, and LED lighting

(b) Improved thermodynamic performance of certain refrigeration cycles and refrigerants, including CO_2 trans-critical systems for retail applications and R-290 for movable room air conditioners

(c) Improved system components, such as inverter-driven compressors, electronic expansion valves, ejectors and new heat exchanger designs

(d) Improved control systems at the product, system and building automation system levels.

17. While refrigerant selection is an important design consideration, its influence on overall energy efficiency is limited – typically in the 5 to 10 per cent range. Reducing leaks through proper installation practices and good design – for example, by minimizing joints and using brazed rather than mechanical connections – reduces refrigerant emissions and helps maintain energy efficiency over the life of the equipment.

18. MEPS drive the market for energy-efficient equipment. The use of MEPS has yielded positive results in countries around the world, including those with high ambient temperatures. The design of

equipment to be used in high-ambient-temperature settings must take into account the high heat loads and very high condensing temperatures.

19. The benefits of a holistic approach and the need to look at building envelope and insulation technologies as well as effective service and refrigerant management were emphasized.

20. Finally, improving energy efficiency in the cold chain helps reduce food waste.

2. Existing products

21. Examples were given of a wide range of opportunities for improving the performance of existing equipment through better control and monitoring and improved maintenance. Several presenters described savings in the 10 to 30 per cent range, with a few examples given of even higher savings. Improving efficiency typically also extends the operating life of equipment. Some key techniques described by presenters included:

(a) Improved metering that identifies poorly performing equipment and maintenance issues

(b) Cleaning of heat exchangers and filters

(c) Ensuring good airflow around heat exchangers

(d) Monitoring and repairing refrigerant leaks.

22. Many presentations stressed the importance of training service technicians to ensure that they understand their role in improving the energy efficiency of RACHP equipment. Experience shows that training is most effective when it includes both theoretical and practical assessments. Refresher training and requalification for new equipment and refrigerants should be incorporated into training requirements. Training should cover leak detection and repairs, equipment cleaning, equipment and control settings, and safety considerations. The provision of information on basic system maintenance to customers and end users can also be important.

23. The discussions highlighted the need for more information comparing the energy efficiency of low-GWP refrigerants to that of hydrochlorofluorocarbons (HCFCs) and HFCs. It was also noted that energy efficiency issues related to maintenance seemed to be common to all types of refrigerants. That view was echoed by the panel members.

C. Investment and financing opportunities

24. The objective of this session was to give an overview of opportunities, experiences and challenges relating to the funding of energy efficiency projects in the RACHP sectors.

25. Governments and development banks have climate targets that can be drivers for increasing energy efficiency. Energy efficiency would improve more rapidly, however, if it were seen as a means to an end. More emphasis should be put on the services that people desire and are willing to pay for, and that financial institutions will therefore support. For example, governments are particularly interested in energy security, industry in productivity, hospitals in safe vaccines, and schools in improving students' performance.

26. While it is often difficult to commoditize energy efficiency projects because different types of projects require different approaches and tailored financial mechanisms, standardization and certification schemes can help by providing greater certainty in terms of performance and creating larger markets for products and services. These developments in turn create business opportunities for equipment suppliers and energy service companies. While such companies have not been universally successful, driven by the notion that "where there is a margin there is a market", they have delivered large-scale energy efficiency investments in China and India; lessons learned from these countries could benefit others. Energy service companies can facilitate financial flows by identifying solutions for overcoming barriers, taking on technical risks, and aggregating large numbers of small projects in order to reduce transaction costs for banks, as has been done successfully by Energy Efficiency Services Limited of India.

27. Energy efficiency projects often have difficulty attracting financing. They are often relatively small, and the benefits accrue not only to the investor, in terms of energy cost savings, but to the broader economy and society – for example, by reducing the need to invest in supply infrastructure or by reducing CO_2 emissions. In other words, even though both public and private stakeholders benefit from improvements in energy efficiency, the up-front costs are not shared.

28. Perceived risks need to be addressed, and real risks need to be managed. There is some evidence that local financial institutions do not take international energy efficiency programmes seriously.

29. It is generally held that, while sufficient funds are available to support energy efficiency measures, these do not flow effectively. It was suggested that a catalogue of funding opportunities be developed as an information source for parties.

D. Policies for improving the energy efficiency of refrigeration, air-conditioning and heat-pumping appliances and systems

30. Two sessions explored policy measures that encourage the uptake of higher-efficiency RACHP products. The first dealt with policies governing domestic appliances and the second with those for larger systems.

31. For domestic appliances, the presentations described three main policy mechanisms: MEPS, energy-labelling programmes and demand response strategies.

32. Many countries around the world are successfully using MEPS to drive markets for more efficient appliances, often in combination with labelling programmes. Mandatory MEPS have been successful both in countries that manufacture energy-using products and in those that import most of their products. It is widely held that mandatory MEPS are the most effective policy measures for removing the least efficient products from the market.

33. Energy labels are voluntary or mandatory mechanisms for encouraging purchases of appliances with performance exceeding the minimum standard. Mandatory comparative labels such as those used in China, Ghana and the European Union and in many other countries help consumers choose more efficient products, while voluntary endorsement labels like the Energy Star label used in the United States of America help consumers choose the most efficient products and drive the market towards higher-efficiency products. Trust in brands is an important aspect of any labelling programme. Market surveillance is important for guaranteeing the success of such programmes. Standards and labels need to be regularly reviewed and updated.

34. Some appliances, such as air conditioners, can be remotely controlled through smartphone applications to reduce or shift periods of peak demand. This is particularly useful when variable renewable energy resources are being integrated into electricity grids. In Australia, for example, one in four houses has rooftop solar panels, and consumers are given incentives to reduce peak demand for power. While these systems are in early stages of development, they could make major contributions to reducing peak energy demand for cooling.

35. For larger equipment, utility demand-side management programmes can overcome some of the barriers to investment in energy efficiency. Utility companies can provide both technical expertise and financing and monetize the financial benefits of reducing peak demand on the electricity grid.

36. Bulk procurement was described as a mechanism that can reduce the size of the capital cost "hump" that occurs when innovative highly energy efficient products reach the market. A bulk procurement business model can work with both domestic appliances and larger RACHP equipment.

37. A presentation on cold chains described how, in some regions, up to 40 per cent of food produced is lost owing to the lack of an integrated cold chain that connects producers to markets and consumers. According to a recent United Nations report, only one in three fish caught ever reaches a plate. The use of small diesel engines on refrigerated lorries creates localized air pollution as well as CO_2 emissions. Alternative approaches to transport refrigeration can overcome some of these issues.

38. District cooling uses economies of scale to save significant amounts of energy, especially in high-ambient-temperature locations, where 70 per cent of electricity consumption goes towards cooling. When district cooling is used in appropriate circumstances, efficiency improvements of over 40 per cent can be achieved.

UNITED NATIONS

EP

UNEP/OzL.Pro.WG.1/40/6/Rev.1

Distr.: General
13 July 2018

Original: English

United Nations Environment Programme

Open-ended Working Group of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer
Fortieth meeting
Vienna, 11–14 July 2018
Item 6 (b) of the provisional agenda*

Summary of the workshop on energy efficiency opportunities while phasing down hydrofluorocarbons

Note by the Secretariat

1. The annex to the present note contains a summary of the workshop on energy efficiency opportunities while phasing down hydrofluorocarbons that was held in Vienna on 9 and 10 July 2018.

2. The summary, which is set out in the annex to the present note, is reproduced as received by the Secretariat, without formal editing.

* UNEP/OzL.Pro.WG.1/40/1/Rev.1.

K1801716 130718

Annex

Summary of the workshop on energy efficiency opportunities while phasing down hydrofluorocarbons (Vienna, 9 and 10 July 2018)

Introduction

1. Under the Kigali Amendment to the Montreal Protocol, parties recognized the importance of maintaining and/or enhancing energy efficiency while transitioning away from high-global-warming-potential (GWP) hydrofluorocarbons (HFCs) to low-GWP alternatives in the refrigeration, air-conditioning and heat-pump sectors. Parties also recognized that maintaining and/or enhancing energy efficiency could have significant climate benefits.

2. A one-and-a-half-day workshop on energy efficiency opportunities while phasing down HFCs was convened in accordance with decision XXIX/10 (para. 4) taken by the parties to the Montreal Protocol on Substances that Deplete the Ozone Layer at their twenty-ninth Meeting, held jointly with the eleventh meeting of the Conference of the Parties to the Vienna Convention for the Protection of the Ozone Layer, in Montreal (20–24 November 2017).

3. The objectives of the workshop were to provide an opportunity for parties and other stakeholders to discuss in depth:

(a) The types of technical opportunities that can be adopted to improve the energy efficiency of both new and existing refrigeration, air-conditioning and heat-pump (RACHP) equipment, as well as improvements to building design

(b) The barriers to these opportunities and the ways in which barriers can be overcome through appropriate policy measures and investments

(c) The connections between Montreal Protocol activities to phase down HFCs and other activities that are addressing energy efficiency issues in the RACHP sectors.

4. The workshop involved 34 speakers, supported by six session facilitators and seven rapporteurs. The more than 450 participants came from governments, industry and industry associations, international and non-governmental organizations, academic institutions, consulting firms and other organizations. Sessions included presentations and panel discussions, with opportunities for all participants to contribute through questions and statements addressed to the speakers, including through a smartphone application that allowed questions to be submitted electronically.

5. The three main sections of the workshop addressed:

(a) The overall context of energy efficiency in the refrigeration, air-conditioning and heat-pump sectors

(b) Technical opportunities for improving RACHP energy efficiency

(c) Investment, financial and policy measures that encourage improved cooling efficiency, and the potential relationship between energy efficiency policies and the Kigali Amendment.

6. Three briefing notes distributed by the Ozone Secretariat in advance of the workshop helped participants better understand energy efficiency issues.

7. The present document summarizes the key issues raised in each session of the workshop, including those raised in presentations and in subsequent question-and-answer sessions with participants.

A. Background to energy efficiency in the refrigeration, air-conditioning and heat-pump sectors

8. The objective of the session was to set the scene by examining overarching issues and challenges to improving energy efficiency in the RACHP sectors.

9. RACHP use in Article 5 countries is expected to more than double by 2030 and more than triple by 2050. Currently, refrigerant emissions and energy use in the RACHP sectors both contribute to global warming, with energy use accounting for more than 80 per cent of the sectors' combined carbon footprint. As a consequence, various interventions will be required to avoid a very large increase in energy demand from the use of RACHP equipment. According to the International Energy

Agency, almost half of the near-term reductions in emissions required to meet the goals of the Paris Agreement can be achieved by adopting cost-effective energy efficiency measures, including in the RACHP sector. Global energy efficiency improved by 13 per cent overall between 2000 and 2016, but progress has since slowed because of a reduction in the number of energy efficiency policies enacted and a decrease in energy prices.

10. There is significant technical potential to reduce RACHP energy consumption by reducing cooling loads; minimizing the temperature lift; accounting for variable operating conditions; selecting the most efficient refrigeration cycle, refrigerant and components; designing effective control systems; monitoring operating performance; and correcting faults.

11. Despite the excellent potential that exists, uptake of energy efficiency measures is slow owing to a lack of understanding of how to improve energy efficiency, poor design and selection of equipment, a lack of monitoring and analysis of performance, and narrow financial analysis that does not value the multiple benefits of energy efficiency improvements.

12. As an example of the benefits and challenges of improving energy efficiency, several presentations highlighted the fact that requiring all new air-conditioning units to be very efficient would cut growth in demand for cooling energy by half. If combined with efficient building design, this would completely eliminate growth in the use of energy for space cooling. The average energy efficiency of air conditioners currently on the market is less than half that of efficient products available in most markets, and one third that of the best available technology. Consumers tend to buy the least expensive units even though the extra capital cost of a more energy-efficient unit is usually recovered within one to three years from the resulting energy savings.

13. The introduction of high-energy-efficiency technologies often creates an initial "price hump" that can make them less competitive than conventional technologies. The size and duration of this hump can be reduced through appropriate policies and financial interventions, such as minimum energy performance standards (MEPS), grants and low-cost loans, and bulk procurement programmes. Presenters and some participants advocated for an integrated approach that links efficiency with the refrigerant transition.

14. Given its many benefits, energy efficiency is best seen as an enabler of sustainable development; RACHP goes far beyond comfort and has positive impacts on food safety, health and many other elements of the Sustainable Development Goals.

B. The technical potential for improving energy efficiency in the refrigeration, air-conditioning and heat-pump sectors

15. Two workshop sessions aimed to outline the technical potential for improving the energy efficiency of new RACHP products (session 2) and existing RACHP products (session 3).

1. New products

16. Presentations highlighted the wide range of new RACHP products that have large energy efficiency improvements compared to older designs; energy savings of well over 50 per cent were illustrated through a number of presentations. Some examples described were:

(a) Reductions in cooling demand through such measures as ventilation cooling, improved building design, doors on retail display cases, and LED lighting;

(b) Improved thermodynamic performance of certain refrigeration cycles and refrigerants, including CO_2 trans-critical systems for retail applications and R-290 for movable room air conditioners;

(c) Improved system components, such as inverter-driven compressors, electronic expansion valves, ejectors and new heat exchanger designs;

(d) Improved control systems at the product, system and building automation system levels.

17. Refrigerant selection is an important design consideration for RACHP equipment. The properties of alternative refrigerants relevant for refrigerant selection included energy efficiency, flammability, toxicity and so on. The direct impact of refrigerant selection on overall energy efficiency is typically in the plus or minus 5 to 10 per cent range. Reducing leaks through proper installation practices and good design – for example, by minimizing joints and using brazed rather than mechanical connections – reduces refrigerant emissions and helps maintain energy efficiency over the life of the equipment.

18. MEPS drive the market for energy-efficient equipment. The use of MEPS has yielded positive results in countries around the world, including those with high ambient temperatures. The design of equipment to be used in high-ambient-temperature settings must take into account the high heat loads and very high condensing temperatures.

19. The benefits of a holistic approach and the need to look at building envelope and insulation technologies as well as effective service and refrigerant management were emphasized.

20. Finally, improving energy efficiency in the cold chain helps reduce food waste.

2. Existing products

21. Examples were given of a wide range of opportunities for improving the performance of existing equipment through better control and monitoring and improved maintenance. Several presenters described savings in the 10 to 30 per cent range, with a few examples given of even higher savings. Improving efficiency typically also extends the operating life of equipment. Some key techniques described by presenters included:

(a) Improved metering that identifies poorly performing equipment and maintenance issues

(b) Cleaning of heat exchangers and filters

(c) Ensuring good airflow around heat exchangers

(d) Monitoring and repairing refrigerant leaks.

22. Many presentations stressed the importance of training service technicians to ensure that they understand their role in improving the energy efficiency of RACHP equipment. Experience shows that training is most effective when it includes both theoretical and practical assessments. Refresher training and requalification for new equipment and refrigerants should be incorporated into training requirements. Training should cover leak detection and repairs, equipment cleaning, equipment and control settings, and safety considerations. The provision of information on basic system maintenance to customers and end users can also be important.

23. The discussions highlighted the need for more information comparing the energy efficiency of low-GWP refrigerants to that of hydrochlorofluorocarbons (HCFCs) and HFCs. It was also noted that energy efficiency issues related to maintenance seemed to be common to all types of refrigerants. That view was echoed by the panel members.

C. Investment and financing opportunities

24. The objective of this session was to give an overview of opportunities, experiences and challenges relating to the funding of energy efficiency projects in the RACHP sectors.

25. Governments and development banks have climate targets that can be drivers for increasing energy efficiency. Energy efficiency would improve more rapidly, however, if it were seen as a means to an end. More emphasis should be put on the services that people desire and are willing to pay for, and that financial institutions will therefore support. For example, governments are particularly interested in energy security, industry in productivity, hospitals in safe vaccines, and schools in improving students' performance.

26. While it is often difficult to commoditize energy efficiency projects because different types of projects require different approaches and tailored financial mechanisms, standardization and certification schemes can help by providing greater certainty in terms of performance and creating larger markets for products and services. These developments in turn create business opportunities for equipment suppliers and energy service companies. While such companies have not been universally successful, driven by the notion that "where there is a margin there is a market", they have delivered large-scale energy efficiency investments in China and India; lessons learned from these countries could benefit others. Energy service companies can facilitate financial flows by identifying solutions for overcoming barriers, taking on technical risks, and aggregating large numbers of small projects in order to reduce transaction costs for banks, as has been done successfully by Energy Efficiency Services Limited of India.

27. Energy efficiency projects often have difficulty attracting financing. They are often relatively small, and the benefits accrue not only to the investor, in terms of energy cost savings, but to the broader economy and society – for example, by reducing the need to invest in supply infrastructure or by reducing CO_2 emissions. In other words, even though both public and private stakeholders benefit from improvements in energy efficiency, the up-front costs are not shared.

28. Perceived risks need to be addressed, and real risks need to be managed. There is some evidence that local financial institutions do not take international energy efficiency programmes seriously.

29. It is generally held that, while sufficient funds are available, these do not always flow effectively in the case of energy efficiency projects. It was suggested that a catalogue of funding opportunities be developed as an information source for parties.

D. Policies for improving the energy efficiency of refrigeration, air-conditioning and heat-pumping appliances and systems

30. Two sessions explored policy measures that encourage the uptake of higher-efficiency RACHP products. The first dealt with policies governing domestic appliances and the second with those for larger systems.

31. For domestic appliances, the presentations described three main policy mechanisms: MEPS, energy-labelling programmes and demand response strategies.

32. Many countries around the world are successfully using MEPS to drive markets for more efficient appliances, often in combination with labelling programmes. Mandatory MEPS have been successful both in countries that manufacture energy-using products and in those that import most of their products. It is widely held that mandatory MEPS are the most effective policy measures for removing the least efficient products from the market.

33. Energy labels are voluntary or mandatory mechanisms for encouraging purchases of appliances with performance exceeding the minimum standard. Mandatory comparative labels such as those used in China, Ghana and the European Union and in many other countries help consumers choose more efficient products, while voluntary endorsement labels like the Energy Star label used in the United States of America help consumers choose the most efficient products and drive the market towards higher-efficiency products. Trust in brands is an important aspect of any labelling programme. Market surveillance is important for guaranteeing the success of such programmes. Standards and labels need to be regularly reviewed and updated.

34. Some appliances, such as air conditioners, can be remotely controlled through smartphone applications to reduce or shift periods of peak demand. This is particularly useful when variable renewable energy resources are being integrated into electricity grids. In Australia, for example, one in four houses has rooftop solar panels, and consumers are given incentives to reduce peak demand for power. While these systems are in early stages of development, they could make major contributions to reducing peak energy demand for cooling.

35. For larger equipment, utility demand-side management programmes can overcome some of the barriers to investment in energy efficiency. Utility companies can provide both technical expertise and financing and monetize the financial benefits of reducing peak demand on the electricity grid.

36. Bulk procurement was described as a mechanism that can reduce the size of the capital cost "hump" that occurs when innovative highly energy efficient products reach the market. A bulk procurement business model can work with both domestic appliances and larger RACHP equipment.

37. A presentation on cold chains described how, in some regions, up to 40 per cent of food produced is lost owing to the lack of an integrated cold chain that connects producers to markets and consumers. According to a recent United Nations report, only one in three fish caught ever reaches a plate. The use of small diesel engines on refrigerated lorries creates localized air pollution as well as CO_2 emissions. Alternative approaches to transport refrigeration can overcome some of these issues.

38. District cooling uses economies of scale to save significant amounts of energy, especially in high-ambient-temperature locations, where 70 per cent of electricity consumption goes towards cooling. When district cooling is used in appropriate circumstances, efficiency improvements of over 40 per cent can be achieved.